

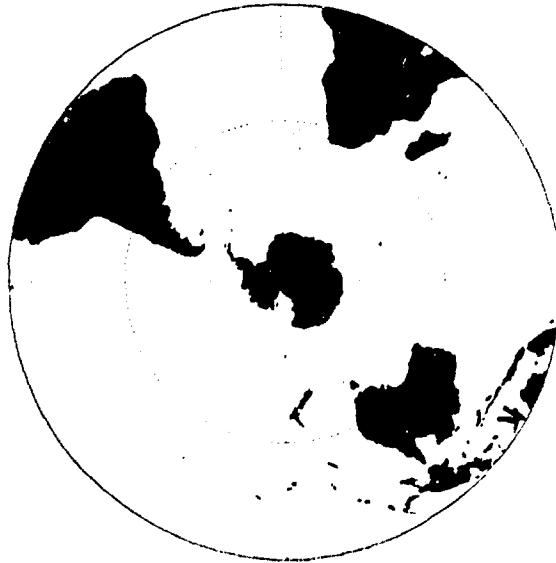
JOINT U.S. NAVY/U.S. AIR FORCE CLIMATIC STUDY OF THE UPPER ATMOSPHERE

VOLUME 4 - APRIL

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JULY, 1989

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PREPARED BY
NAVAL OCEANOGRAPHY COMMAND DETACHMENT
ASHEVILLE, N.C.

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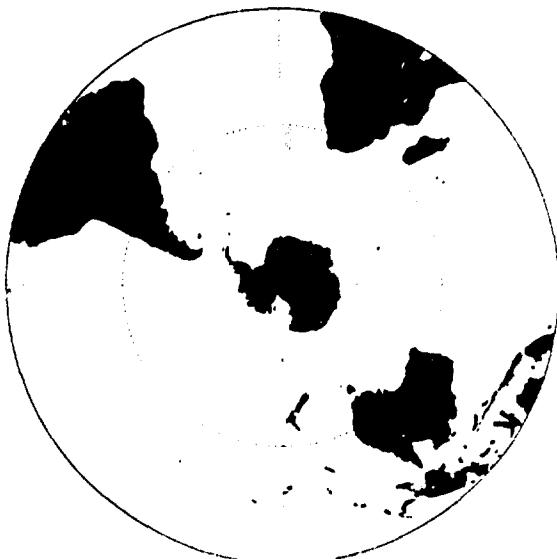


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<p>This study of the upper atmosphere is based on 1980-85 twice daily gridded analysis produced by the European Centre for Medium Range Weather Forecasts. Included are global analyses of (1) Mean Temperature/Standard Deviation, (2) Mean Geopotential Height/Standard Deviation, (3) Mean Density/Standard Deviation, (4) Height and Vector Standard Deviation. All for 13 pressure levels - 1000, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30 mb. In addition, analyses of (5) Mean Dew Point/Standard Deviation - levels 1000 through 300 mb, (6) jet stream (mean scalar speed) - levels 500 through 30 mb. Also included are global 5 degree grid point wind roses for the 13 pressure levels.</p>			
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22a NAME OF RESPONSIBLE INDIVIDUAL <u>Brian L. Wallace</u>	22b TELEPHONE (Include Area Code) <u>(704) 252-7865</u>	22c OFFICE SYMBOL	

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83 APR edition may be used until exhausted
All other editions are obsolete

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INTRODUCTION

During the past decade, improvements in the collection and assimilation of data required for more accurate representations of the atmosphere have resulted in data sets useful for developing a more definitive climatology of the global atmosphere. Such a climatology has uses in aircraft operations and planning, indirect assessments of atmospheric transport as well as a standard state from which atmospheric anomalies can be analyzed.

Prior climatologies, U.S. Navy (1959), U.S. Navy (1966), Naval Weather Service Command (1969), and Naval Weather Service Command (1970), were produced from individual station data with varying periods of record, and the resulting summarized data were analyzed. A serious deficiency was the lack of reporting locations in the major ocean basins. Analyses over the oceans were derived by extrapolating from known analyses over coastal regions as well as the few island or ocean vessels available. An additional complication was the manually intensive effort required to ensure horizontal and vertical consistency of the data.

With the advent, in the 1970s, of more powerful computers and data collection and assimilation systems, the initial analyses used for input into forecast models had a three-fold advantage over the station analyses utilized in the prior climatologies. First, the data assimilation system utilized a greater variety of information for production of an analysis. The normal array of land-based upper air reporting stations was supplemented by ship-based reporting stations, cloud reports, pilot reports and, most importantly, satellite-derived temperature, moisture and wind data. Consequent analyses more accurately represented the state of the atmosphere at a given observation time. Second, the assimilation system quality-controlled all incoming data and ensured the horizontal and vertical consistency of the resulting analyses. Finally, through the computer-based system, global data were available and archived in grid-point form.

A number of analysis sets produced by various national and international meteorological services were investigated. It is recognized that improvements to the data assimilation and analysis systems occurred within any analysis set produced, and that current analyses more accurately reflect the atmosphere's state than do the earlier analyses. It is also recognized that specific parameter or geographic-based deficiencies exist in all analysis sets. However, the intent of this upper-air climatology effort is the production of analyses to serve the needs of the operational meteorologist. A climatology derived from global analyses achieves this goal. Based on known capabilities and technical reviews of the various systems, as well as recommendations from the professional numerical modeling community, the analyses produced by the European Centre for Medium-range Forecasts were selected for processing.

ECMWF DATA

The European Centre for Medium-range Weather Forecasts (ECMWF) is an international organization established in 1973 and supported by 17 member states. It is responsible for providing global forecasts to the European community. Their data assimilation system consists of multivariate optimal interpolation analysis allowing the incorporation of a variety of observations with differing error characteristics and spatial distributions. A relatively comprehensive coverage of global data is ensured through the data collection schedule. A unique feature of the ECMWF system is the method of grid point analysis. Rather than analyzing individual grid points, varying sized boxes (depending on data density) are created containing groups of grid points. Grid point analysis uses data from within the box as well as adjacent boxes, thereby assuring a consistent analysis between all the grid points.

The system also includes internal quality control which examines the climatological reasonability of incoming data as well as the internal consistency of the data.

In addition, the system utilizes a model initialization process which ensures that harmful gravity waves, caused by imbalances in the analysis, with the potential to create problems in subsequent forecast fields, are suppressed. Through the initialization process, the atmosphere's mass and wind fields are adjusted so that only a portion of the gravity wave balanced by dynamic and physical processes is retained. Further information on the ECMWF system is available in Lorenc (1981), Shaw, et al. (1984), Lonnberg, et al. (1986), and ECMWF (1988).

The resulting initialized analyses are vertically interpolated to these 13 standard pressure levels: 1000, 850, 700, 500, 400, 300, 250, 200, 150, 100, 70, 50, and 30 mb, and include the geopotential height, temperature, and wind for all levels with moisture included for the 1000 through 300 mb levels.

Six years (1980-1985) of individual analysis were obtained from ECMWF on a 2.5° global grid. Although the analyses were permanently archived as spherical harmonic coefficients, ECMWF reconstituted the analyses for use in the data processing. Synoptic analyses at six-hour intervals were received for the six-year period, but only the 00 and 12Z analyses were re-sorted into a grid point sort. Given the quality control performed by ECMWF on collected data and the requirements for horizontal and vertical data consistency imposed by the assimilation system, minimal quality control was performed prior to summarization. Primary quality control was limited to comparison of level data against known/estimated climatological extremes.

The summarized grid point data were objectively analyzed, machine-contoured by parameter and level on polar stereographic (0°-90°N and S) and cylindrical equidistant (0°-60°N and S) projections with resulting contours machine-labeled. In addition, individual wind observations were consolidated into eight 45° segments centered on directions north, northeast, ... through northwest for display as wind roses on a series of cylindrical equidistant projections.

Since the ECMWF analyses were archived as spectral harmonic coefficients, the grid point reconstitution process provides data for all global 2.5° grid points. This naturally includes (for the 1000 through 700 mb levels) selected grid points at which the land elevations exceed the height of the pressure surface. For these grid points, a blanking program was used to eliminate both contours and grid point wind roses.

ANALYSES

1. Pressure-Height

Grid point geopotential height values (in dekameters) are summarized by month for 13 levels from 1000 mb to 30 mb with solid and dashed contours of mean values presented on pressure height charts. Standard deviation of height is calculated from the individual daily values with contours presented on a separate chart series including the standard deviation of vector mean wind. Local points of highest and lowest pressure are designated with H's and L's on the analyzed charts. Not all pressure centers are enclosed by closed contours. Vector mean wind in 5-knot increments are calculated for selected grid points considered adequate to depict flow for the hemisphere with wind shaft orientation related to specific latitude/longitude lines. Vector mean winds less than 2.5 knots are depicted as a shaft with no barbs. Contours of mean geopotential height and vector mean wind barbs are presented for the northern/southern hemispheres on polar stereographic projection and for 0° to 60° north and south on cylindrical equidistant projections with blanking for appropriate high elevation land areas on the 1000 through 700 mb charts.

2. Wind Roses

Wind roses for 10° grid points from 5° to 85° north and south are presented by month for all levels from 1000 mb to 30 mb. Each hemisphere is divided into three longitudinal zones: 60°W to 60°E, 60°E to 180°E, and 180°W to 60°W. Each rose presents:

- a) Scalar mean speed
- b) Percent frequency of occurrence from each of 8 cardinal point wind directions proportional to shaft length with dots on the shafts representing 5 percentile intervals.
- c) Mean speed for each of the 8 cardinal wind directions rounded to the nearest 5 knots.

Roses for grid points on the 1000 mb through 700 mb level charts are blanked whenever the land elevation exceeds the mean geopotential height of the specified level.

3. Temperature

Grid point temperature data (in °C) are summarized by month for 13 levels from 1000 mb to 30 mb with solid and dashed contours of mean values presented on pressure height charts. Temperature standard deviation derived from the individual observations are shown on the same charts with dotted contours. Contours are presented for both the northern and southern hemispheres on a polar stereographic projection and for the zone from 0° to 60° north and south on cylindrical equidistant projections with blanking for appropriate high elevation land areas on the 1000 through 700 mb charts.

4. Dew Point

Grid point moisture data were received as mixing ratios for the period through April 19, 1982 and as relative humidity thereafter for the 1000 through 300 mb levels. All moisture data were converted to dew point values. These are summarized by month with solid and dashed contours of mean values presented on pressure height charts. Dew point standard deviation derived from the individual observations are shown on the same charts with dotted contours. Contours are presented for both the northern and southern hemispheres on a polar stereographic projection and for the zone from 0° to 60° north and south on cylindrical equidistant projections with blanking for appropriate high elevation land areas on the 1000 through 700 mb charts.

5. Density

Grid point density data were computed from the daily values of temperature and pressure from the equation of state in the form

$$\rho = \frac{P}{RT}$$

where ρ is the density, P is the pressure, T is the temperature, and R is the gas constant. Density was computed for moist air through 300 mb and for dry air from 250 mb to 30 mb. Density data (in Kg/m³) are summarized by month for all 13 levels with solid and dashed contours of mean values presented on pressure height charts. Density standard deviation derived from individual observations are shown on the same charts with dotted contours. Contours are presented for both the northern and southern hemispheres on a polar stereographic projection and for the zone from 0° to 60° north and south on cylindrical equidistant projections with blanking for appropriate high elevation land areas on the 1000 through 700 mb charts.

6. Standard Deviation of Height and Vector Mean Wind

Standard deviation of the height and vector mean wind data presented on the pressure height charts are presented on monthly charts for the 1000 through 30 mb levels. Height standard deviations (in dekameters) are presented as solid contours and vector wind standard deviations (in knots) as dashed contours. Contours are presented for both the northern and southern hemispheres on a polar stereographic projection and for the zone from 0° to 60° north and south on cylindrical equidistant projections with blanking for appropriate high elevation land areas on the 1000 through 700 mb charts.

7. Jet Stream

Grid point scalar mean wind speed (in knots), as presented by the value in the center of the wind rose octagons, are summarized by month and analyzed for 500 through 30 mb. All speeds exceeding 50 knots are shaded with shading intensity increasing by 25-knot increments. Contours are presented for both the northern and southern hemispheres on a polar stereographic projection and for the zone from 0° to 60° north and south on cylindrical equidistant projections.

DATA AVAILABILITY

Monthly summarized grid point data for the period of record for all levels from 1000 through 30 mb have been retained on magnetic tape. Data available, per level, include:

Number of observations
Mean zonal wind component and standard deviation
Mean meridional wind component and standard deviation
Vector mean wind and standard deviation
Mean temperature and standard deviation
Mean dew point (through 300 mb) and standard deviation
Mean geopotential height and standard deviation
Mean density and standard deviation
Mean scalar wind speed and percentage of observations for each designated direction

Similarly summarized data for each half-month of the 1980-85 period are also available on magnetic tape. Summaries can be provided on magnetic media or in listing form by the National Climatic Data Center.

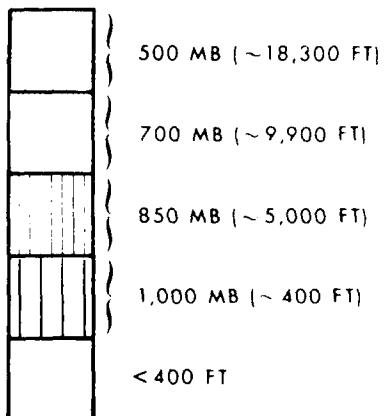
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- U.S. Navy, 1959: Upper Wind Statistics Charts of the Northern Hemisphere, VOL I-III, NAVAIR 50-1C-535.
- U.S. Navy, 1966: Components of the 1000 mb Winds of the Northern Hemisphere, NAVAIR 50-1C-51.

PRESSURE - HEIGHT
(13 LEVELS, 1000 TO 30 MB)

- Contours of mean height (solid and dashed lines) in geopotential dekameters; example: 580 is 5800 geopotential meters; solids labeled, dashed intermediates unlabeled
- Height labeled interval:
 - 6 dekameters (60 meters) - 1000 MB to 400 MB
 - 12 dekameters (120 meters) - 300 MB to 200 MB
 - 8 dekameters (80 meters) - 150 MB to 30 MB
- Vector mean wind in knots
- Contours blanked for geographic areas with elevations exceeding specified geopotential heights

ELEVATION SCALE



Mean Geopotential Height (dkm)

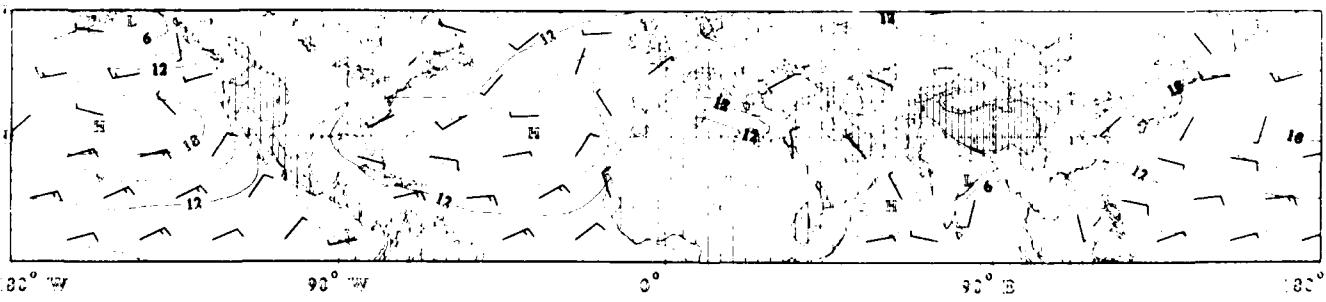
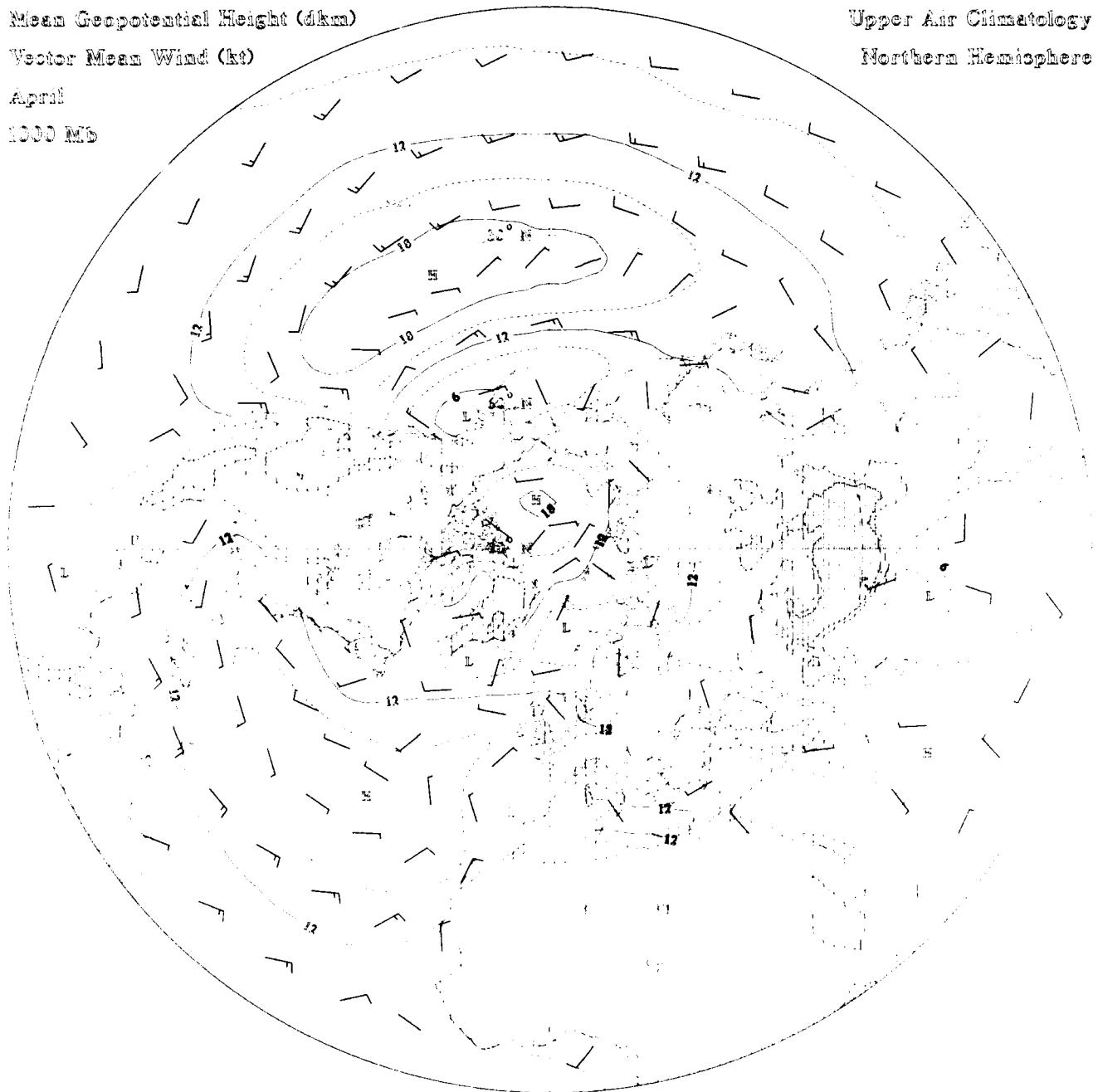
Vector Mean Wind (kt)

April

1000 MB

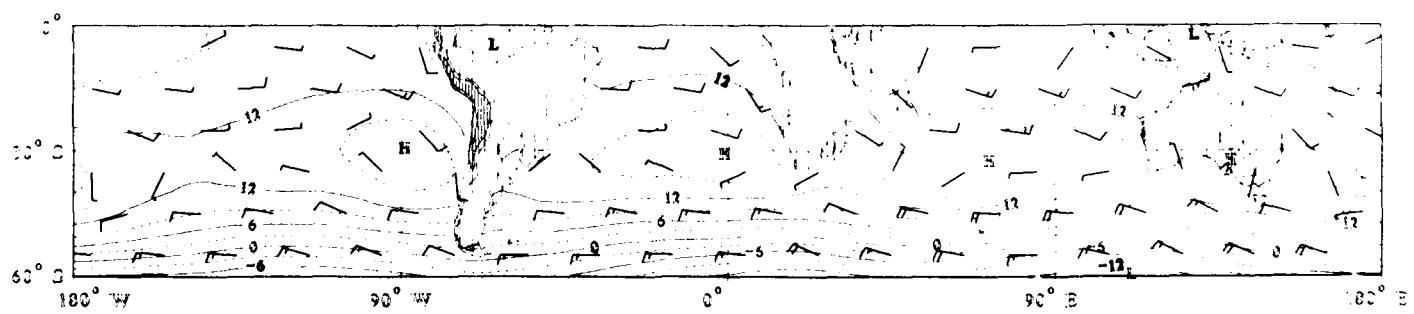
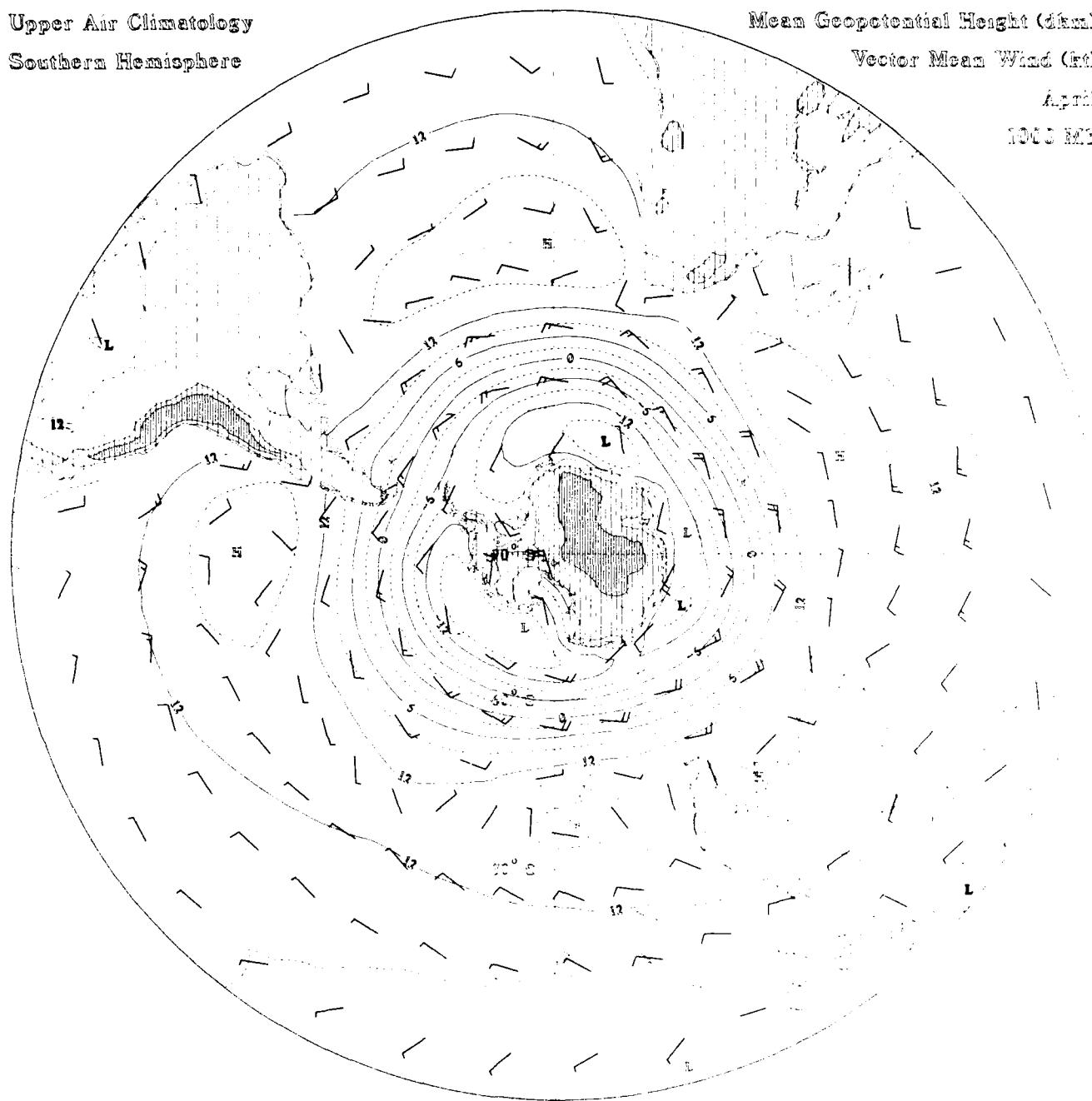
Upper Air Climatology

Northern Hemisphere



Upper Air Climatology
Southern Hemisphere

Mean Geopotential Height (dkm)
Vector Mean Wind (ft)
April
1960 ME



Mean Geopotential Height (dkm)

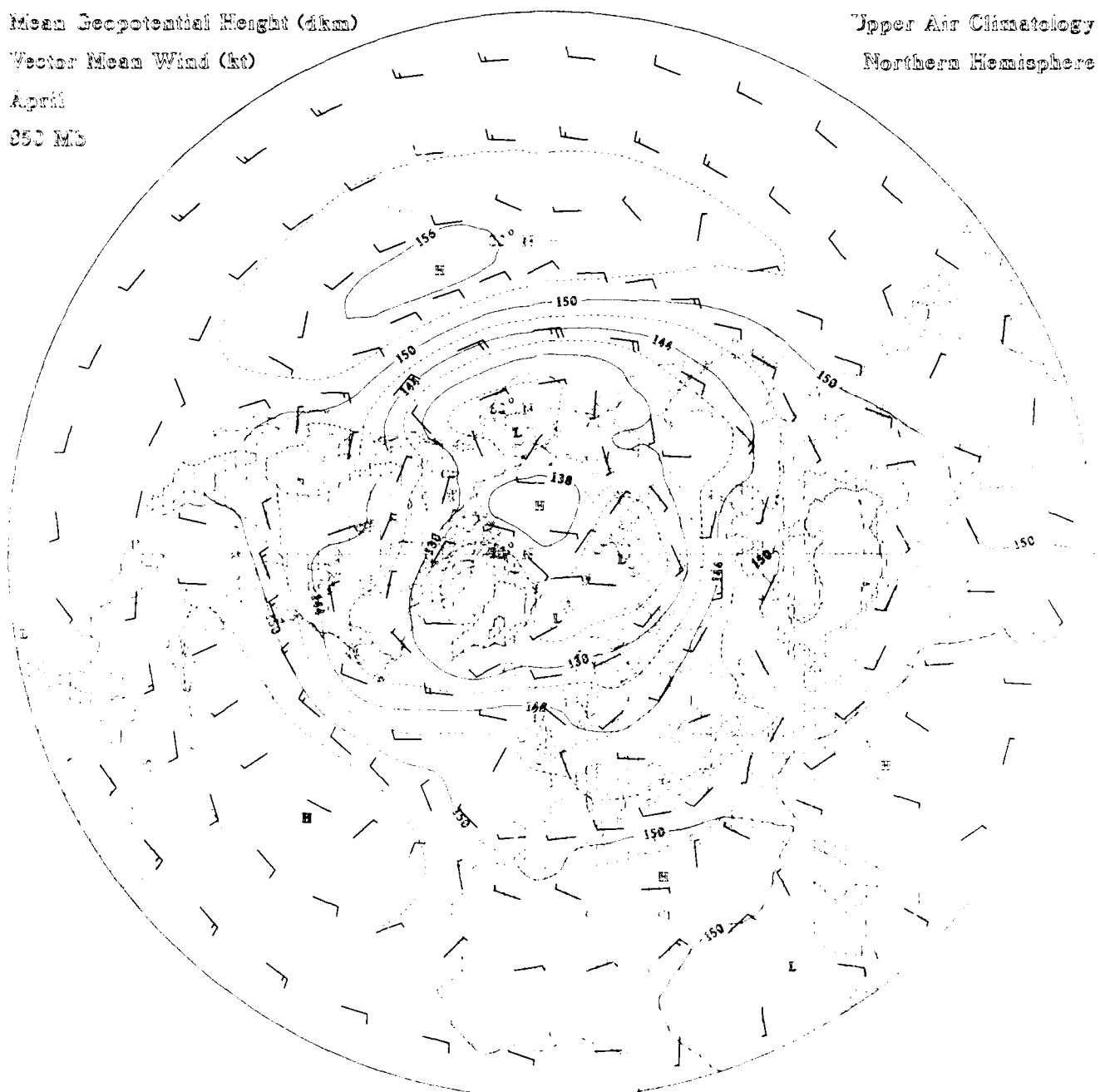
Vector Mean Wind (kt)

April

850 MS

Upper Air Climatology

Northern Hemisphere



Upper Air Climatology

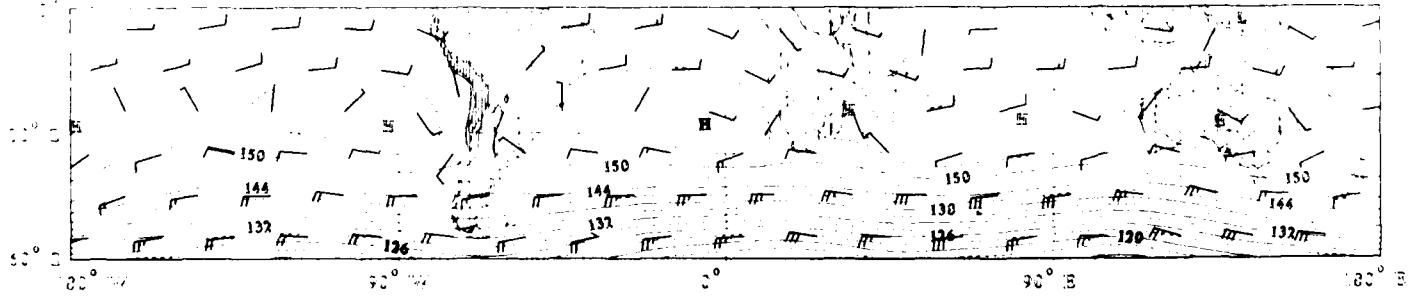
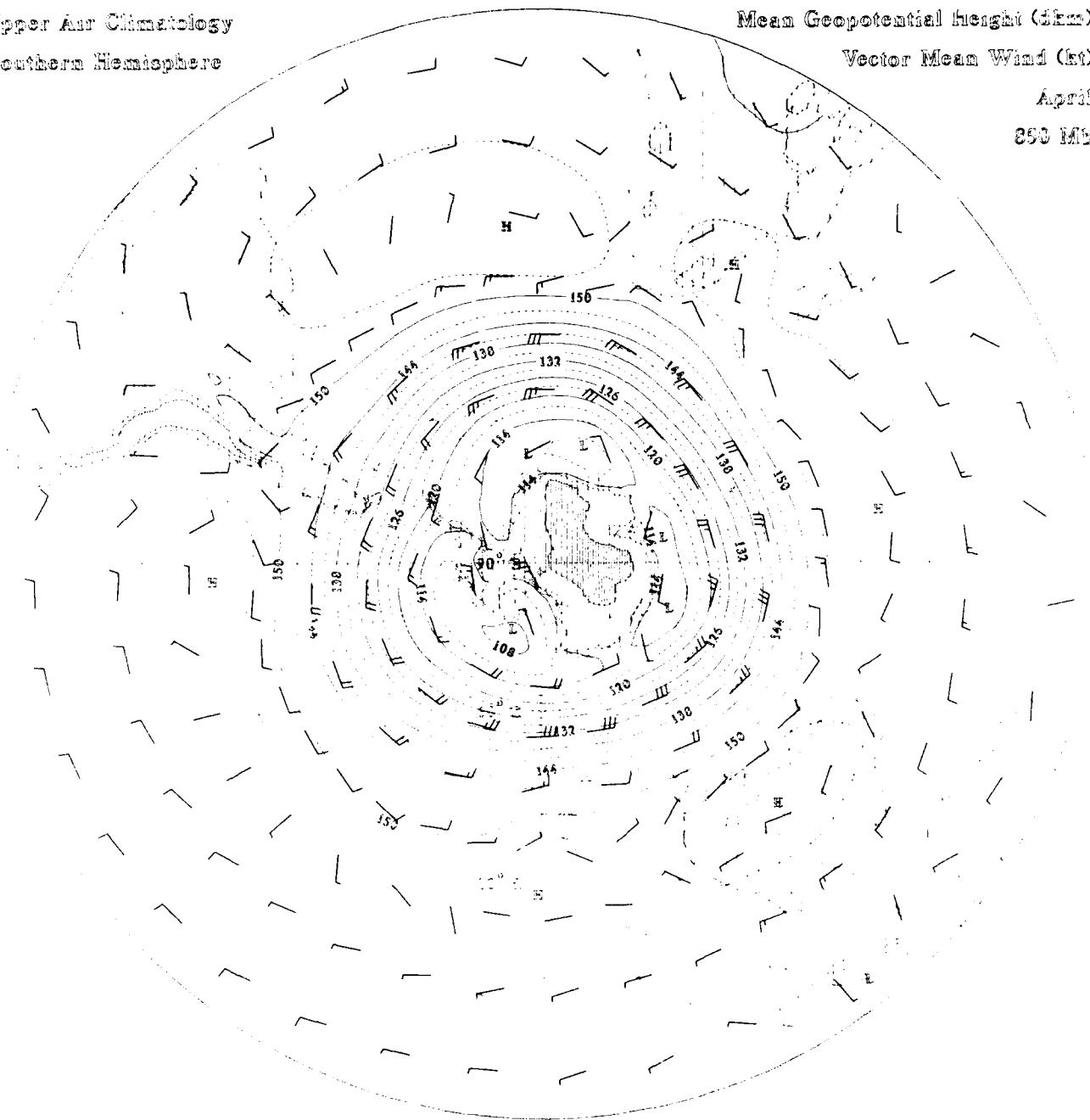
Southern Hemisphere

Mean Geopotential Height (dkm)

Vector Mean Wind (kt)

April

850 Mb



Mean Geopotential Height (dkm)

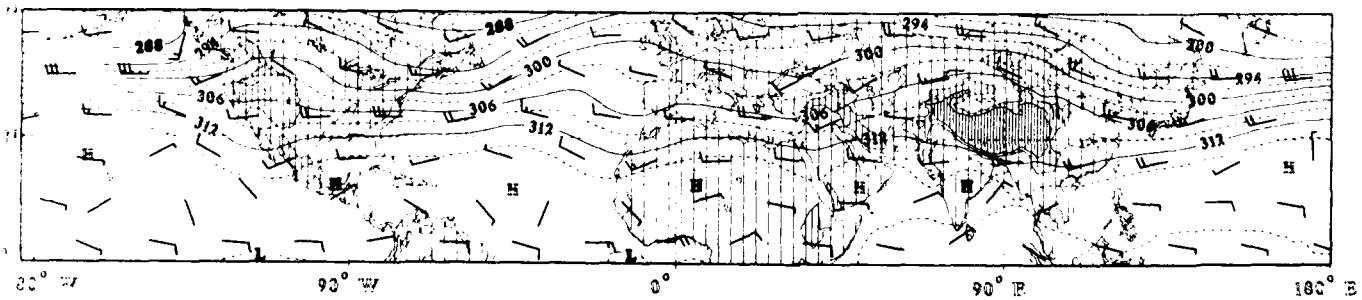
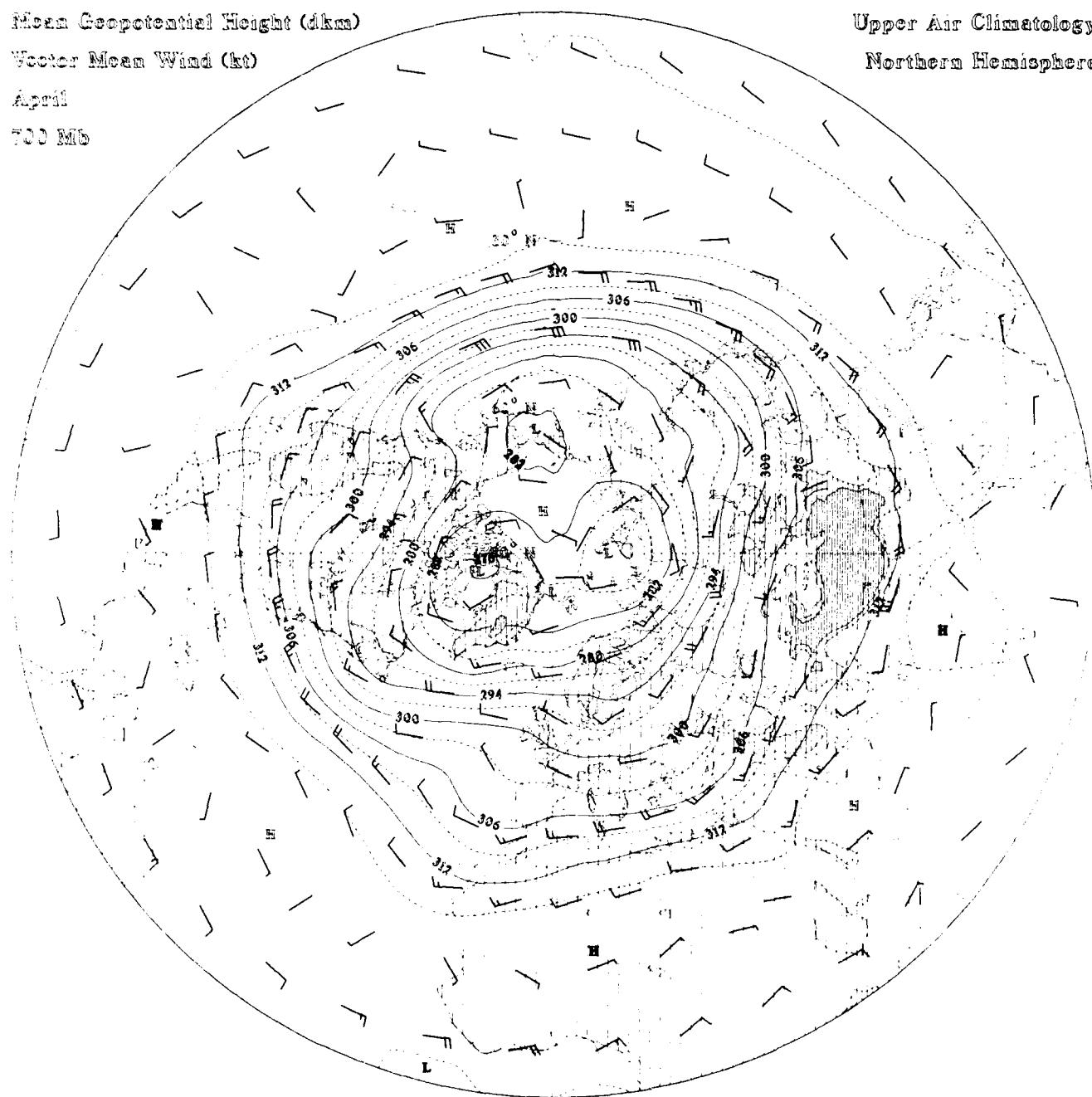
Vector Mean Wind (kt)

April

700 Mb

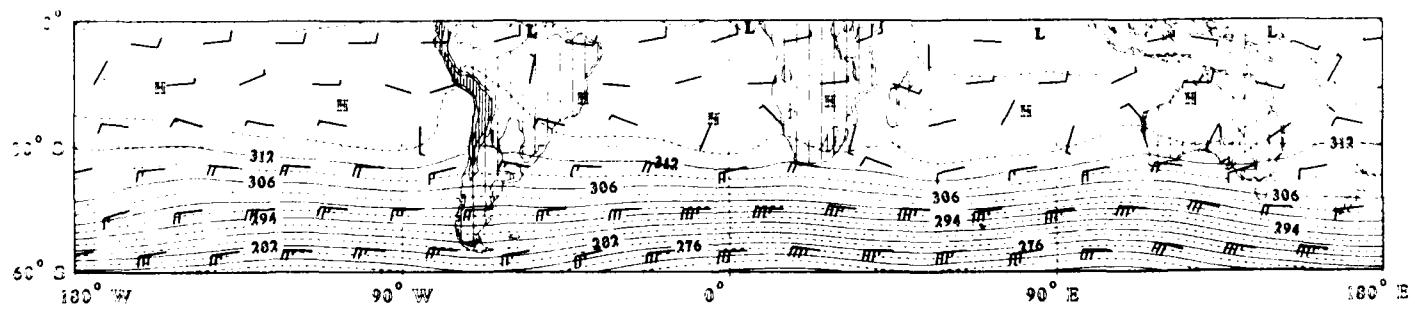
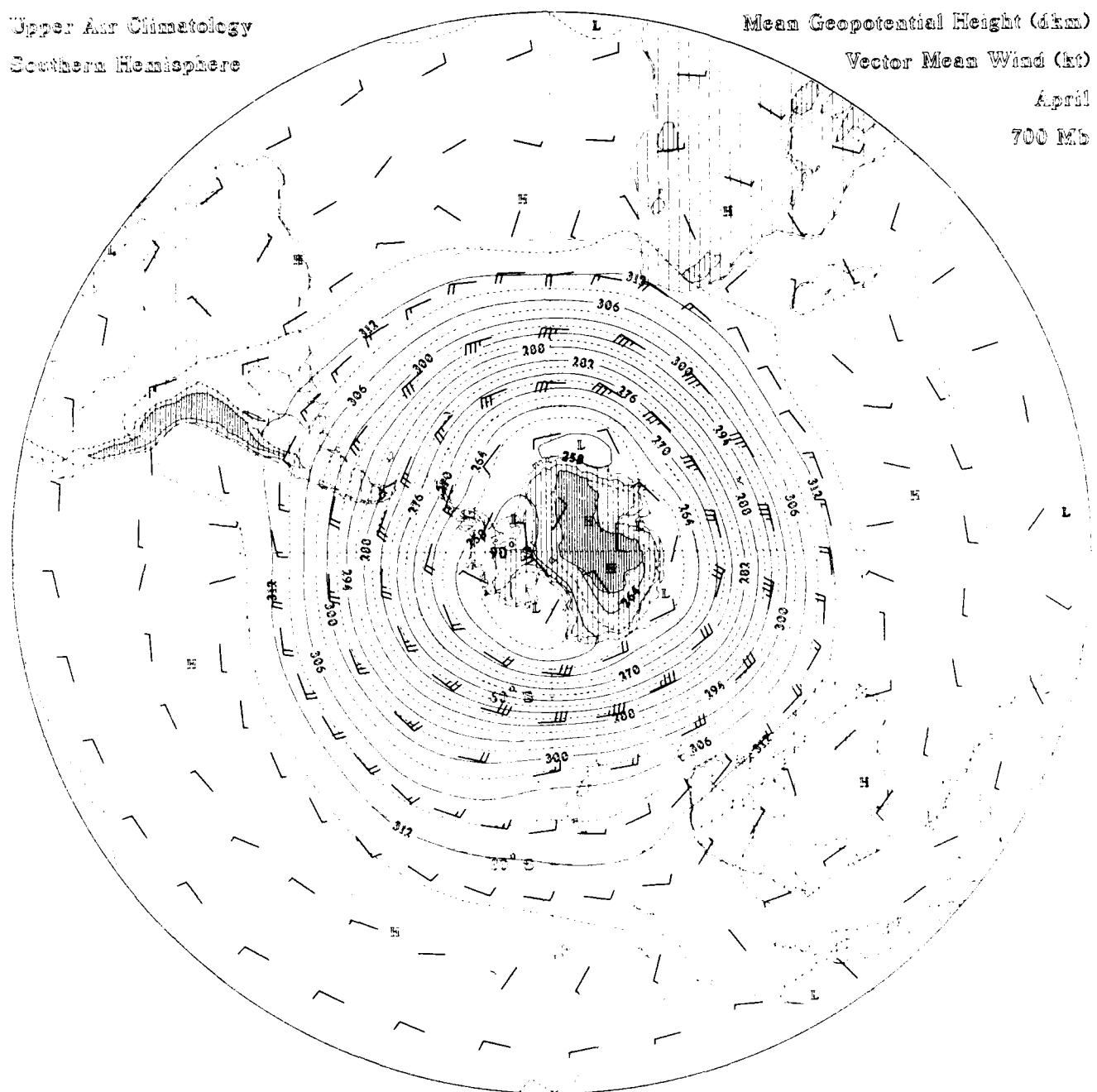
Upper Air Climatology

Northern Hemisphere



Upper Air Climatology
Southern Hemisphere

Mean Geopotential Height (dkm)
Vector Mean Wind (kt)
April
700 MB



Mean Geopotential Height (dkm)

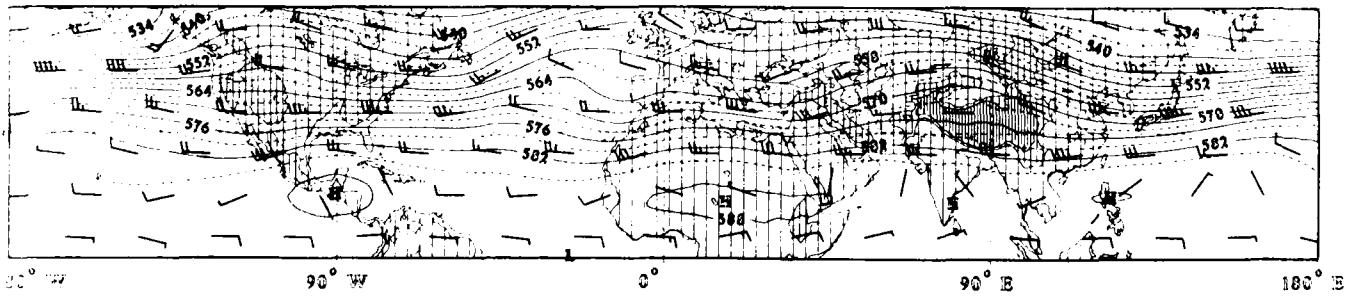
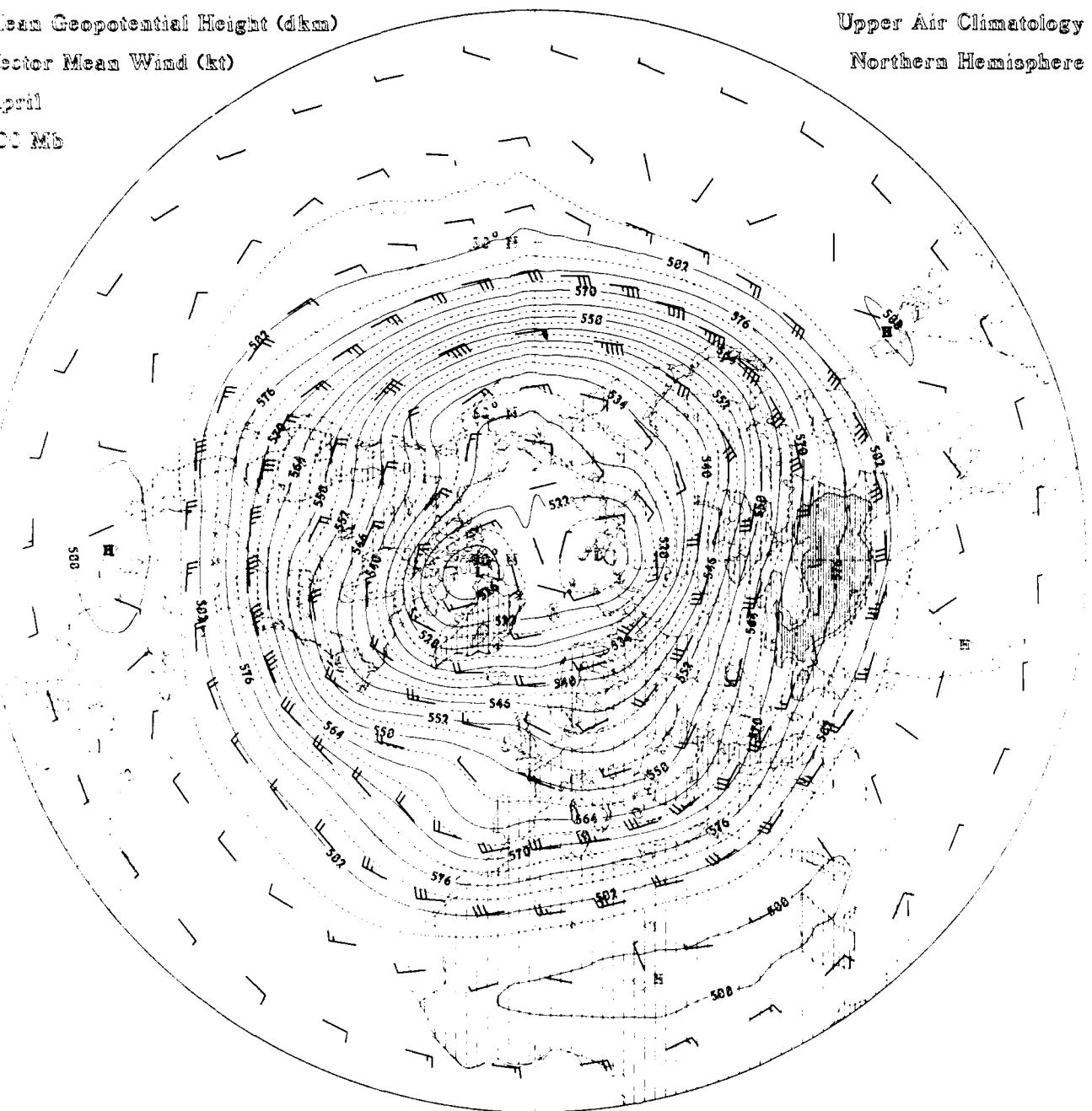
Vector Mean Wind (kt)

April

900 Mb

Upper Air Climatology

Northern Hemisphere



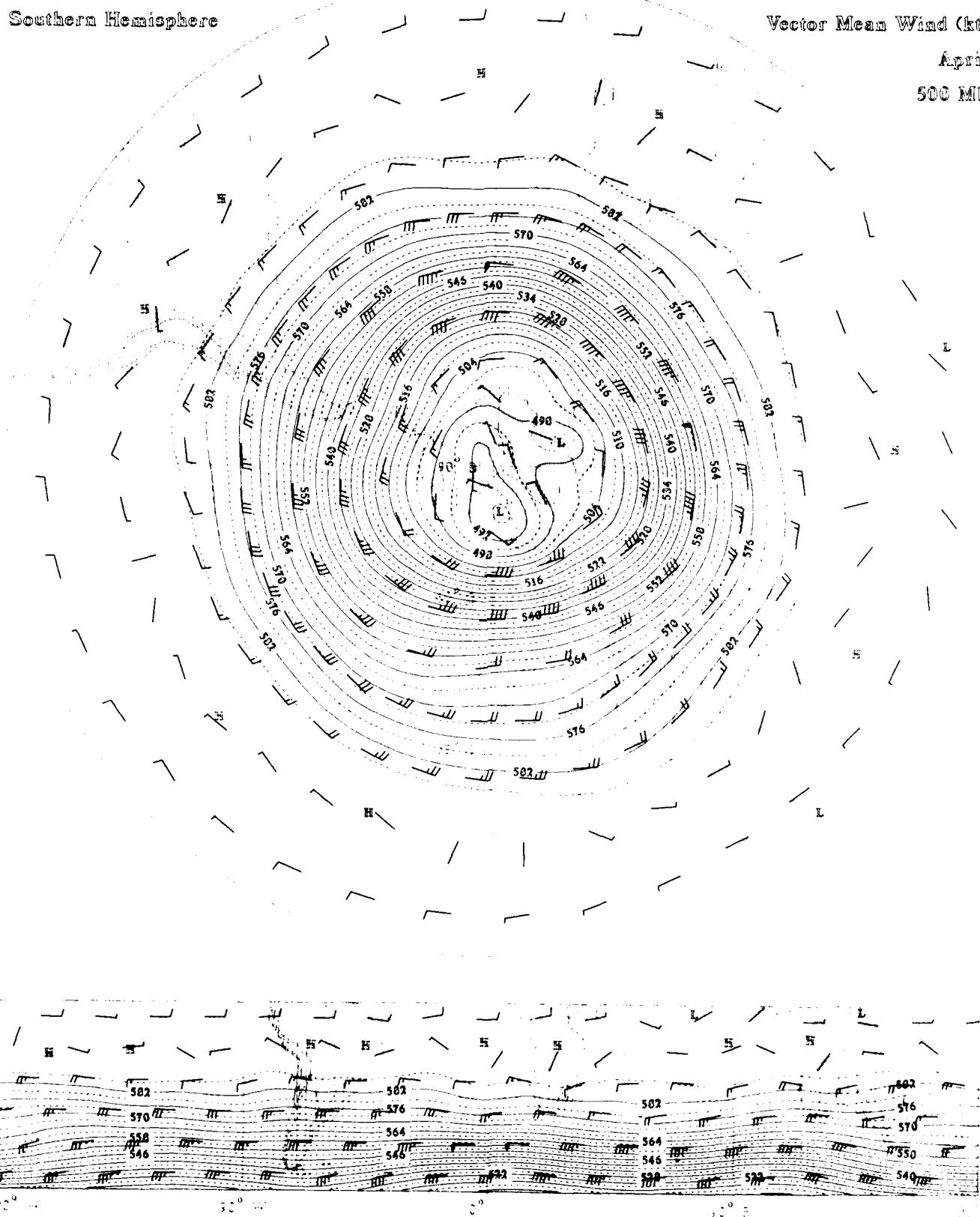
Upper Air Climatology
Southern Hemisphere

Mean Geopotential Height (dkm)

Vector Mean Wind (kt)

April

500 Mb



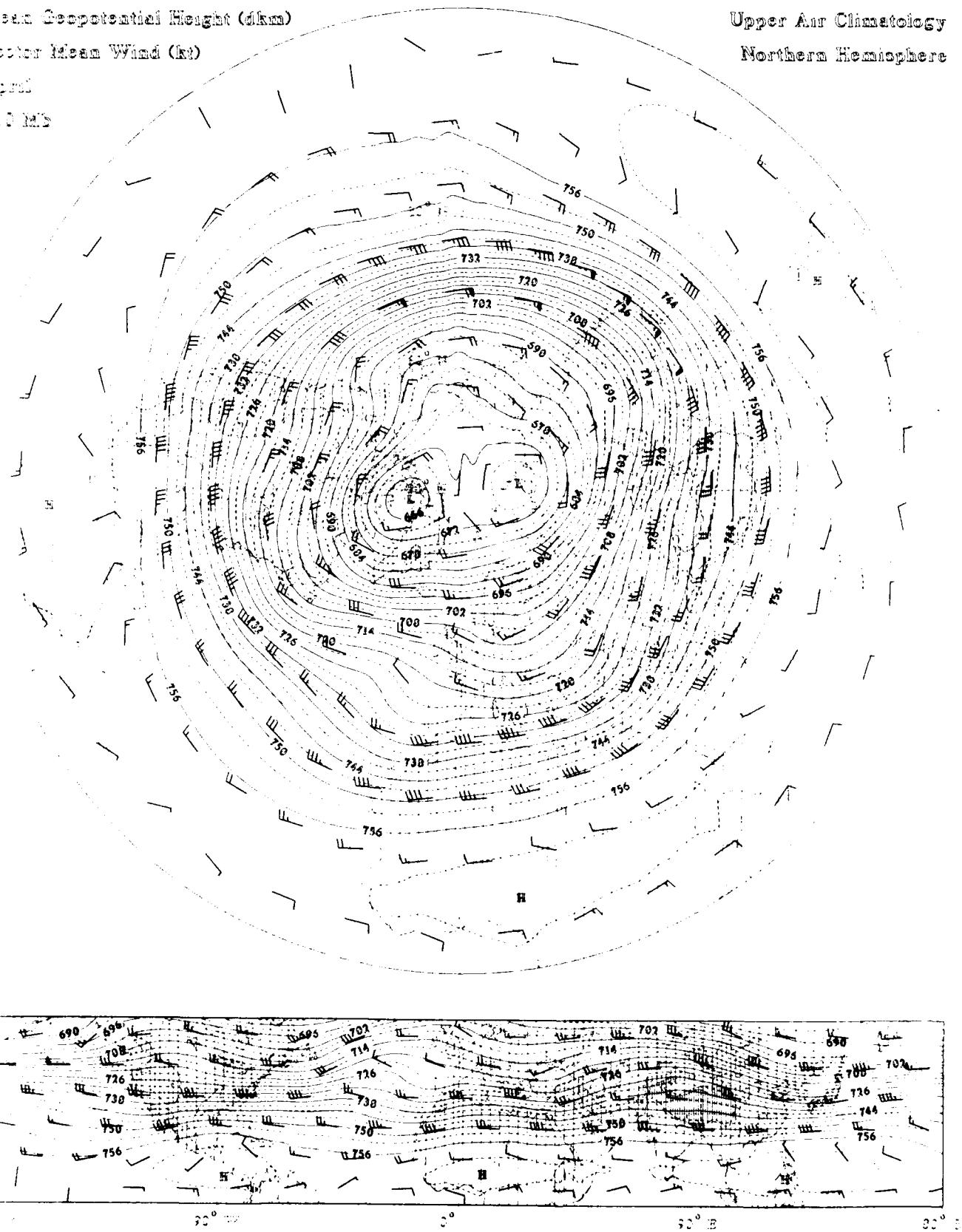
Mean Geopotential Height (dkm)

Sector Mean Wind (kt)

617

4.2.3.2

Upper Air Climatology Northern Hemisphere

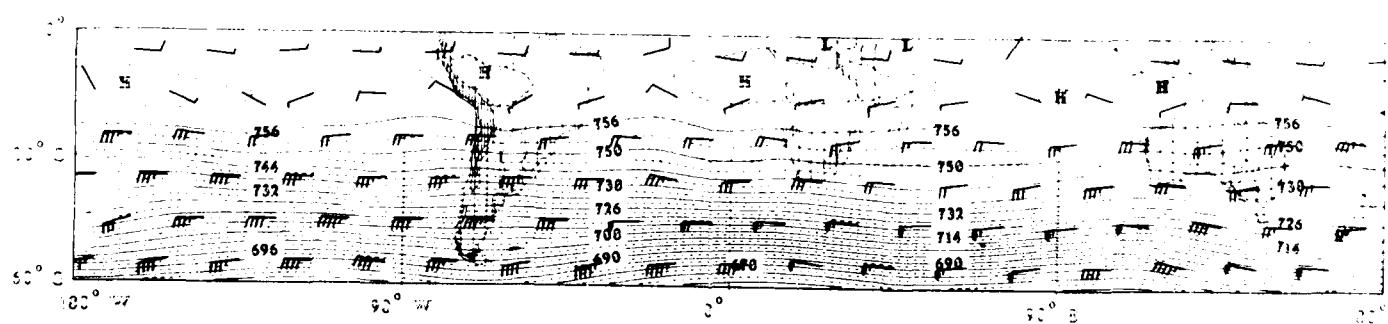
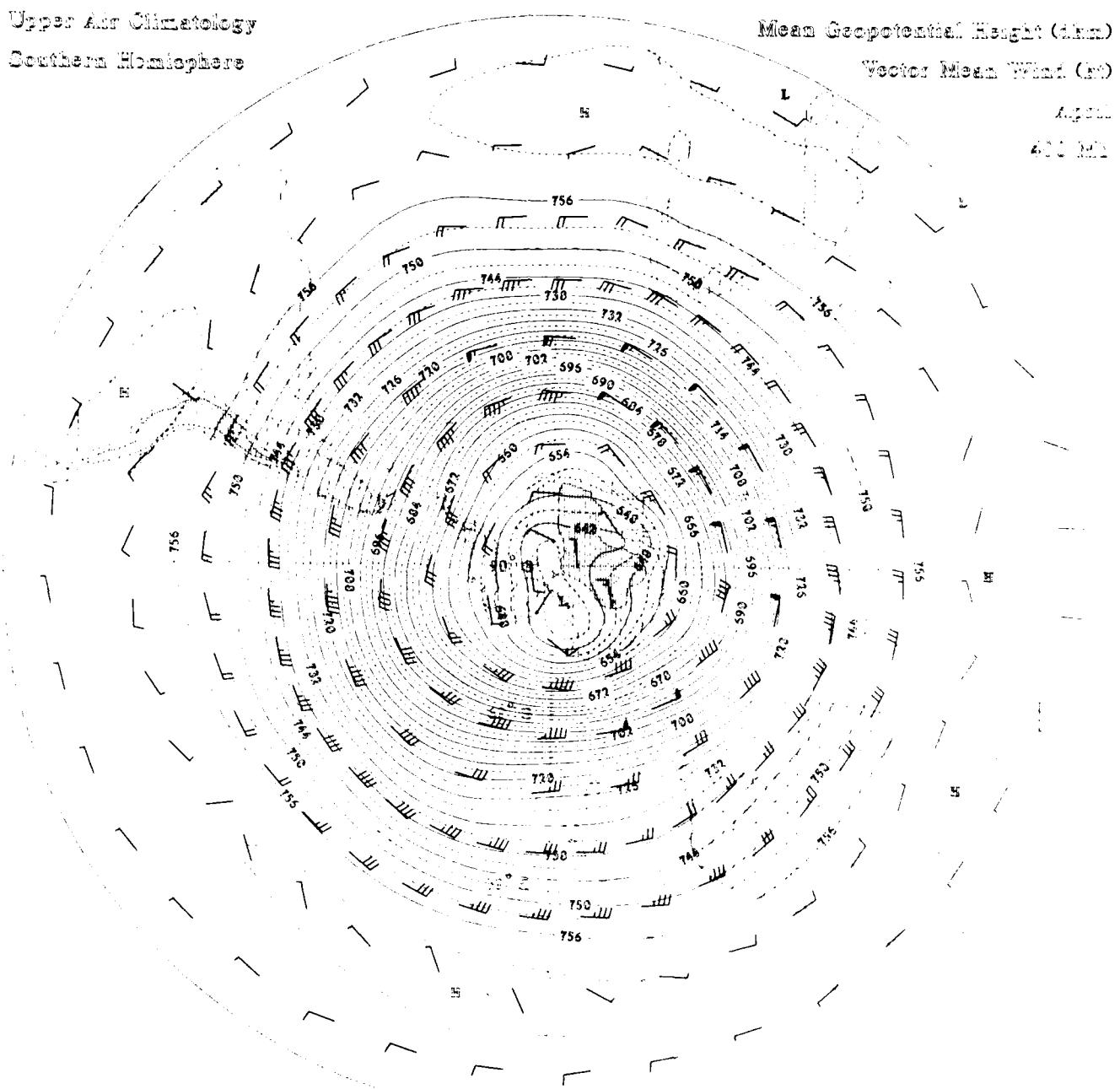


Upper Air Climatology
Southern Hemisphere

Mean Geopotential Height (dkm)

Vector Mean Wind (m)

Aug 1951
61° S



Mean Geopotential Height (dkm)

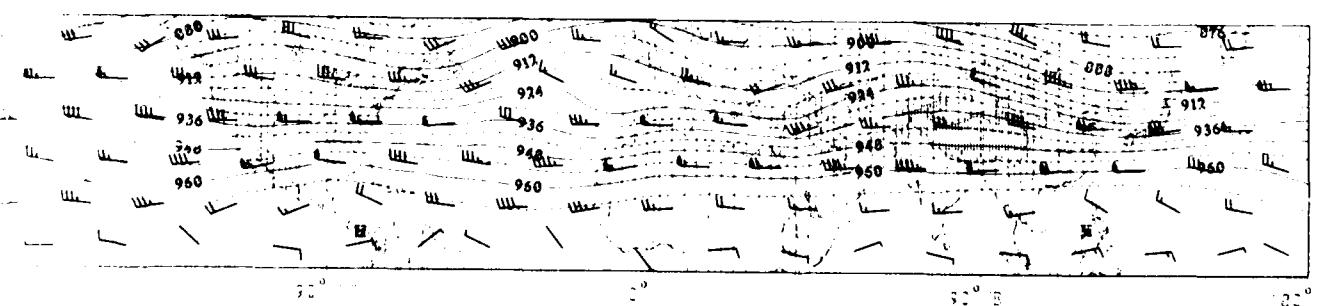
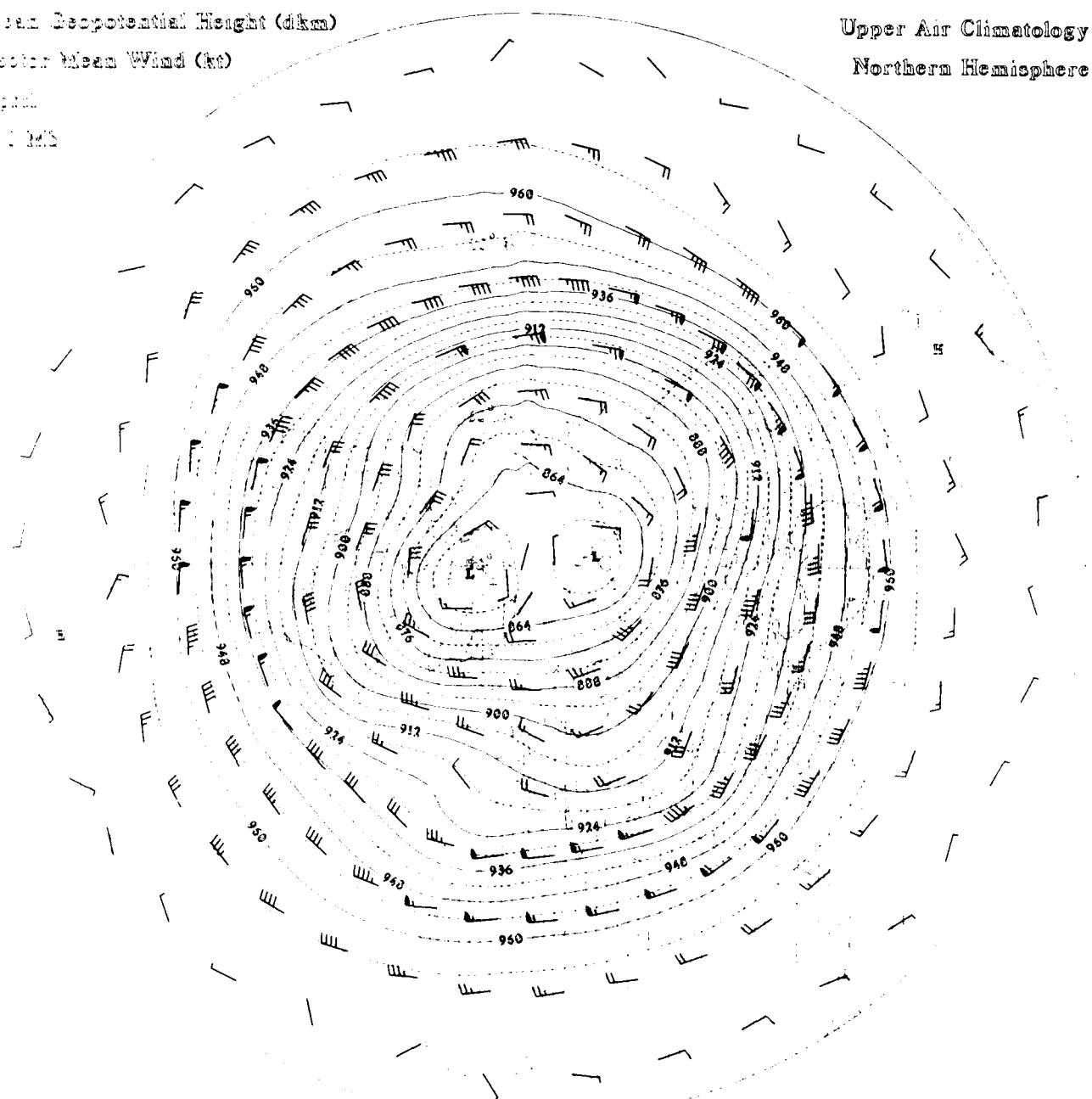
Vector Mean Wind (kt)

geost.

100 hPa

Upper Air Climatology

Northern Hemisphere



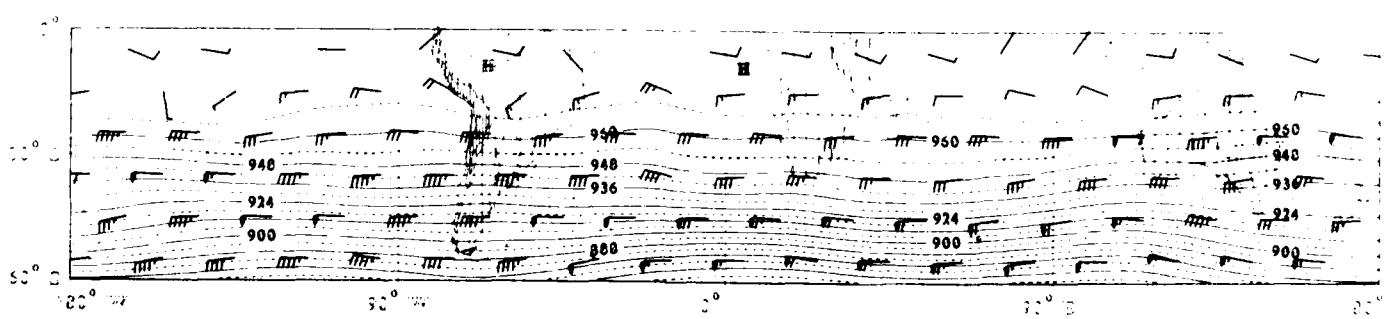
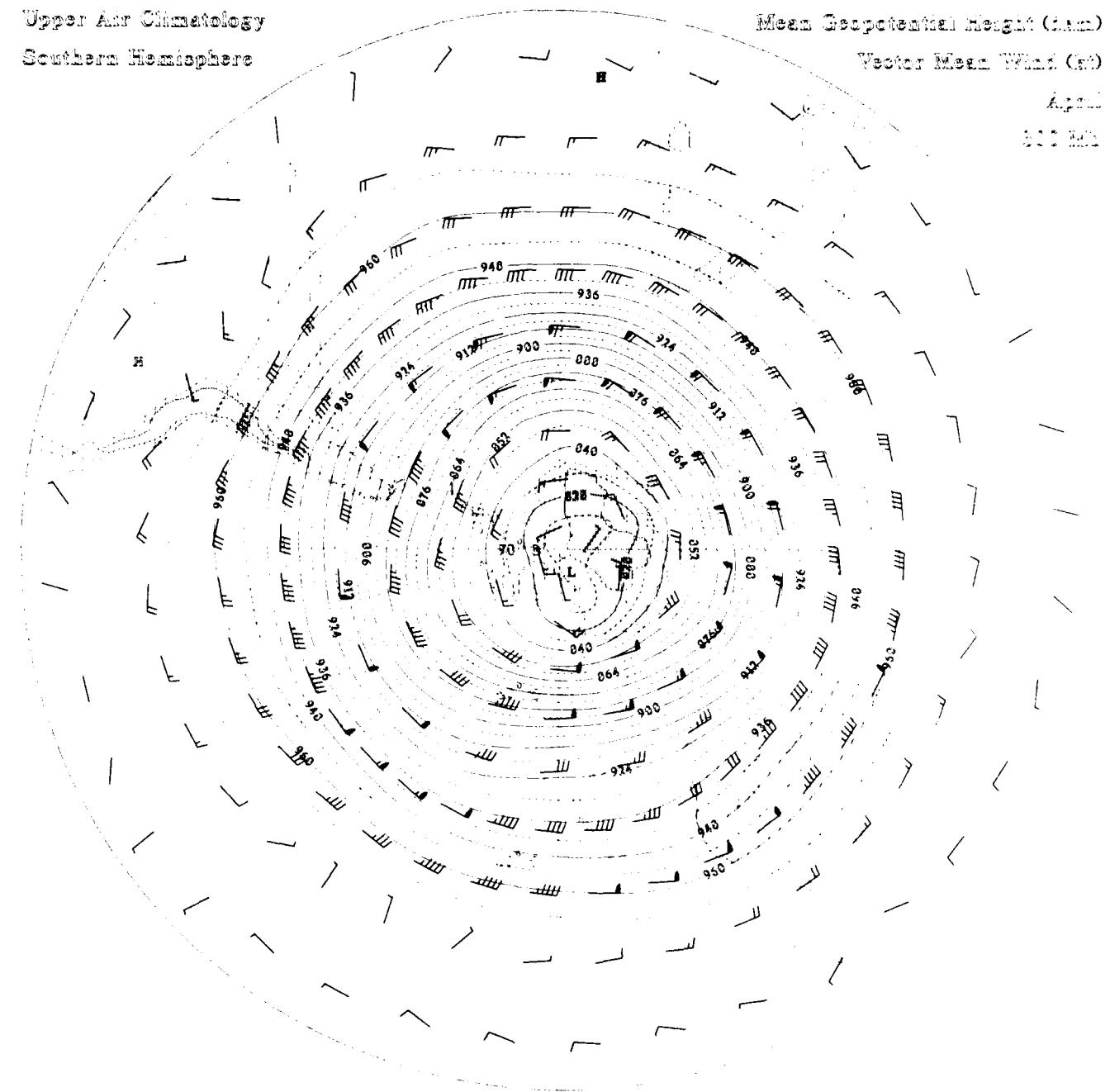
Upper Air Climatology

Southern Hemisphere

Mean Geopotential Height (m)

Vector Mean Wind (m)

1000 mb



Mean Geopotential Height (dkm)

Vector Mean Wind (kt)

Upper Air Climatology

Northern Hemisphere

Aug 1971

51° N

1000 hPa

1000-1008 hPa

1008-1016 hPa

1016-1024 hPa

1024-1032 hPa

1032-1040 hPa

1040-1048 hPa

1048-1056 hPa

1056-1064 hPa

1064-1072 hPa

1072-1080 hPa

1080-1088 hPa

1088-1096 hPa

1096-1104 hPa

1104-1112 hPa

1112-1120 hPa

1120-1128 hPa

1128-1136 hPa

1136-1144 hPa

1144-1152 hPa

1152-1160 hPa

1160-1168 hPa

1168-1176 hPa

1176-1184 hPa

1184-1192 hPa

1192-1200 hPa

1200-1208 hPa

1208-1216 hPa

1216-1224 hPa

1224-1232 hPa

1232-1240 hPa

1240-1248 hPa

1248-1256 hPa

1256-1264 hPa

1264-1272 hPa

1272-1280 hPa

1280-1288 hPa

1288-1296 hPa

1296-1304 hPa

1304-1312 hPa

1312-1320 hPa

1320-1328 hPa

1328-1336 hPa

1336-1344 hPa

1344-1352 hPa

1352-1360 hPa

1360-1368 hPa

1368-1376 hPa

1376-1384 hPa

1384-1392 hPa

1392-1400 hPa

1400-1408 hPa

1408-1416 hPa

1416-1424 hPa

1424-1432 hPa

1432-1440 hPa

1440-1448 hPa

1448-1456 hPa

1456-1464 hPa

1464-1472 hPa

1472-1480 hPa

1480-1488 hPa

1488-1496 hPa

1496-1504 hPa

1500-1508 hPa

1508-1516 hPa

1516-1524 hPa

1524-1532 hPa

1532-1540 hPa

1540-1552 hPa

1521-1533 hPa

1547-1556 hPa

1572-1581 hPa

1597-1606 hPa

1621-1630 hPa

1645-1654 hPa

1669-1678 hPa

1678-1687 hPa

1716-1725 hPa

1739-1748 hPa

1762-1771 hPa

1785-1794 hPa

1798-1807 hPa

1831-1840 hPa

1864-1873 hPa

1886-1895 hPa

1909-1918 hPa

1931-1940 hPa

1954-1963 hPa

1976-1985 hPa

1999-2008 hPa

2021-2030 hPa

2044-2053 hPa

2066-2075 hPa

2089-2098 hPa

2111-2120 hPa

2134-2143 hPa

2157-2166 hPa

2179-2188 hPa

2211-2220 hPa

2243-2252 hPa

2275-2284 hPa

2307-2316 hPa

2339-2348 hPa

2380-2389 hPa

2412-2421 hPa

2444-2453 hPa

2476-2485 hPa

2508-2517 hPa

2540-2549 hPa

2572-2581 hPa

2614-2623 hPa

2645-2654 hPa

2677-2686 hPa

2709-2718 hPa

2741-2750 hPa

2772-2781 hPa

2814-2823 hPa

2845-2854 hPa

2877-2886 hPa

2909-2918 hPa

2941-2950 hPa

2972-2981 hPa

2981-2990 hPa

2995-3004 hPa

3077-3086 hPa

3109-3118 hPa

3141-3150 hPa

3172-3181 hPa

3214-3223 hPa

3245-3254 hPa

3277-3286 hPa

3309-3318 hPa

3341-3350 hPa

3372-3381 hPa

3409-3418 hPa

3441-3450 hPa

3472-3481 hPa

3504-3513 hPa

3536-3545 hPa

3568-3577 hPa

3599-3608 hPa

3631-3640 hPa

3662-3671 hPa

3694-3703 hPa

3725-3734 hPa

3757-3766 hPa

3789-3798 hPa

3820-3829 hPa

3852-3861 hPa

3883-3892 hPa

3925-3934 hPa

3957-3966 hPa

3989-3998 hPa

4020-4029 hPa

4052-4061 hPa

4083-4092 hPa

4115-4124 hPa

4147-4156 hPa

4179-4188 hPa

4211-4220 hPa

4243-4252 hPa

4275-4284 hPa

4307-4316 hPa

4339-4348 hPa

4371-4380 hPa

4413-4422 hPa

4445-4454 hPa

4477-4486 hPa

4509-4518 hPa

4541-4550 hPa

4572-4581 hPa

4604-4613 hPa

4636-4645 hPa

4668-4677 hPa

4700-4709 hPa

4742-4751 hPa

4774-4783 hPa

4806-4815 hPa

4838-4847 hPa

4880-4889 hPa

4912-4921 hPa

4944-4953 hPa

4976-4985 hPa

5008-5017 hPa

5040-5049 hPa

5072-5081 hPa

5104-5113 hPa

5136-5145 hPa

5178-5187 hPa

5210-5219 hPa

5242-5251 hPa

5274-5283 hPa

5306-5315 hPa

5338-5347 hPa

5380-5389 hPa

5412-5421 hPa

5444-5453 hPa

5476-5485 hPa

5508-5517 hPa

5540-5549 hPa

5572-5581 hPa

5614-5623 hPa

5646-5655 hPa

5678-5687 hPa

5710-5719 hPa

5742-5751 hPa

5774-5783 hPa

5806-5815 hPa

5838-5847 hPa

5880-5889 hPa

5912-5921 hPa

5944-5953 hPa

5976-5985 hPa

6008-6017 hPa

6040-6049 hPa

6072-6081 hPa

6104-6113 hPa

6136-6145 hPa

6168-6177 hPa

6199-6208 hPa

6231-6240 hPa

6263-6272 hPa

6295-6304 hPa

6327-6336 hPa

6359-6368 hPa

6400-6409 hPa

6442-6451 hPa

6474-6483 hPa

6506-6515 hPa

6538-6547 hPa

6580-6589 hPa

6612-6621 hPa

6644-6653 hPa

6676-6685 hPa

6708-6717 hPa

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6804-6813 hPa

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6878-6887 hPa

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7112-7121 hPa

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Upper Air Climatology

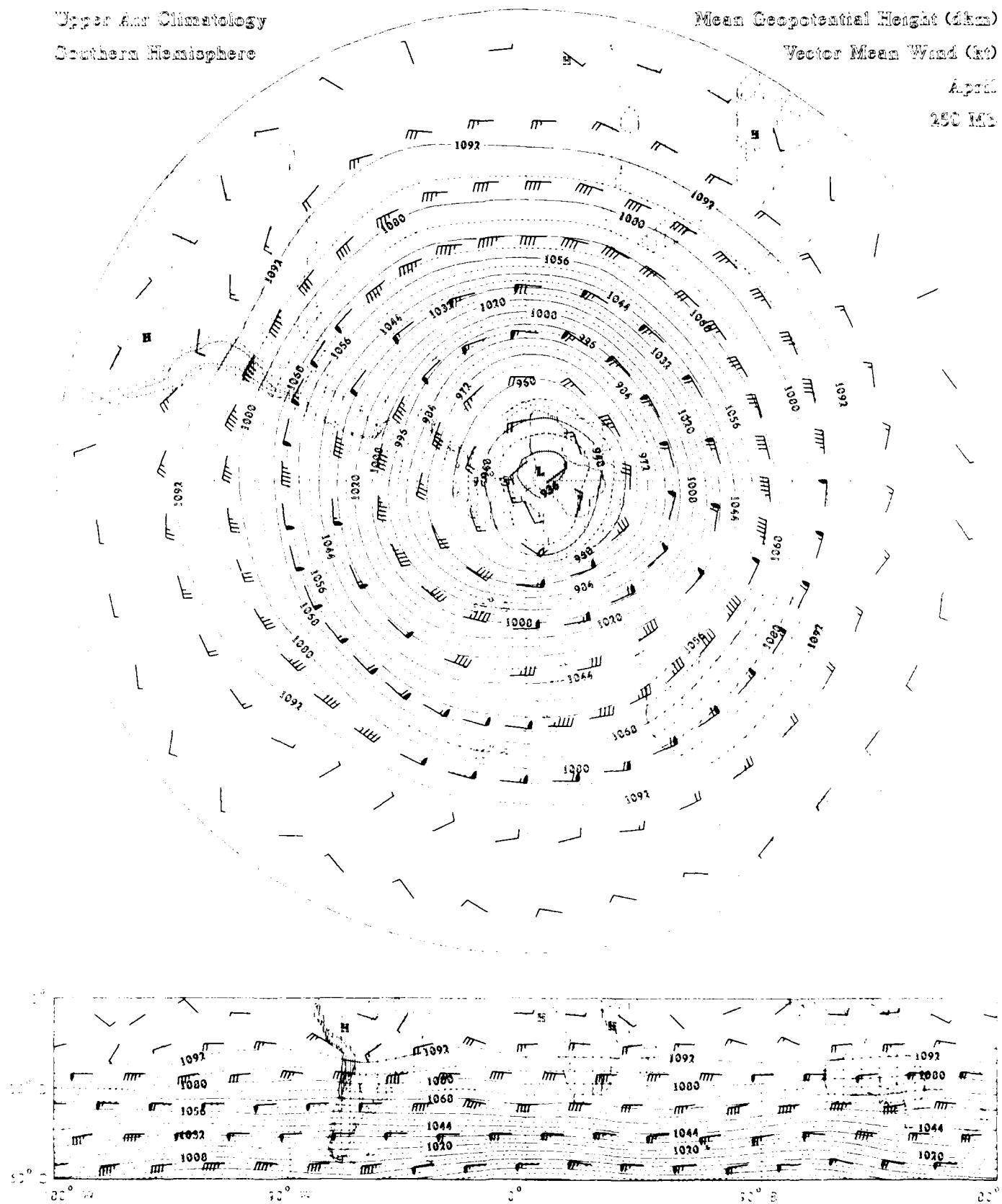
Southern Hemisphere

Mean Geopotential Height (dkm)

Vector Mean Wand (VMW)

Environ Biol Fish

250 W.



Mean Geopotential Height (dkm)

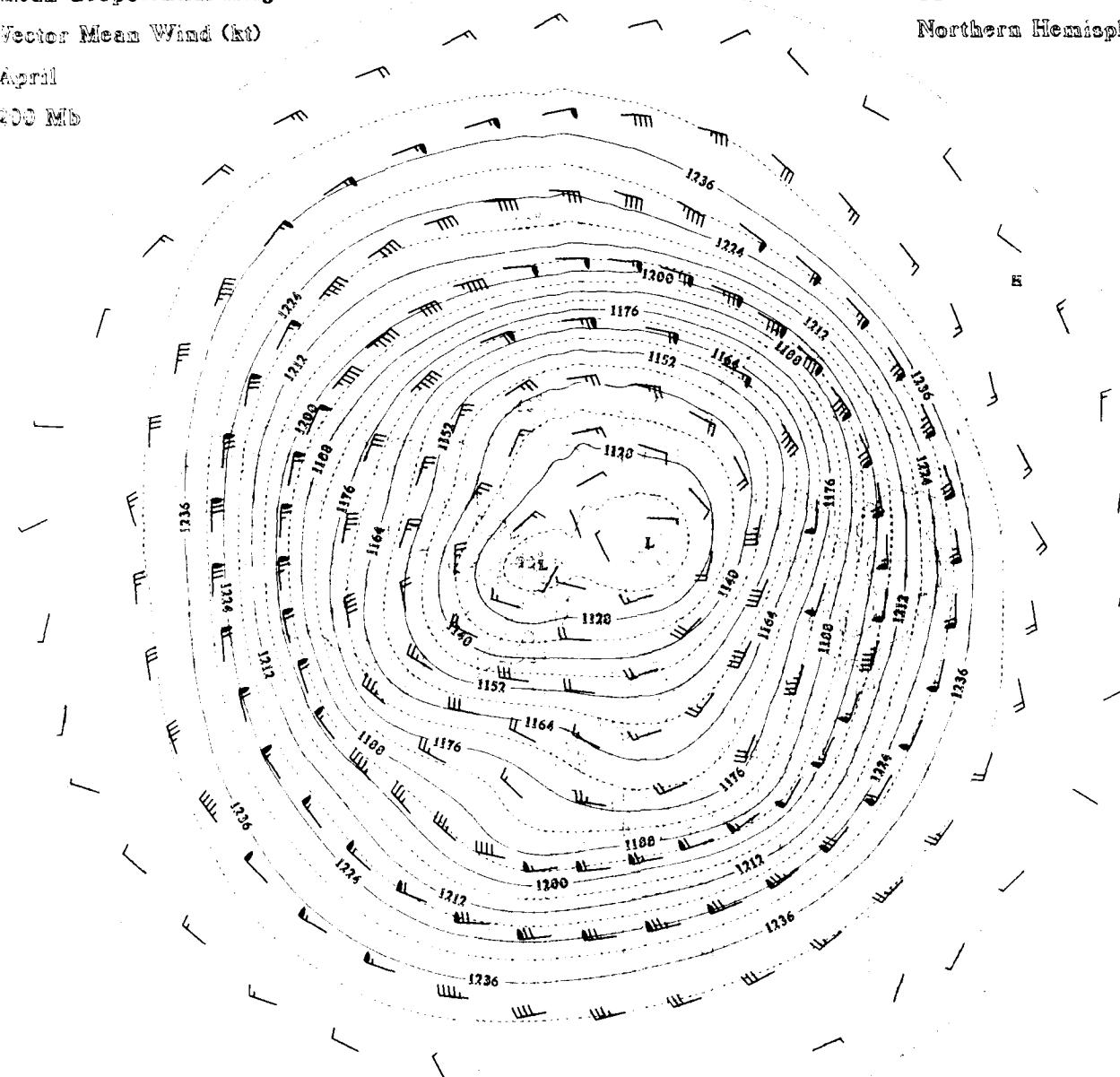
Vector Mean Wind (kt)

April

200 MB

Upper Air Climatology

Northern Hemisphere



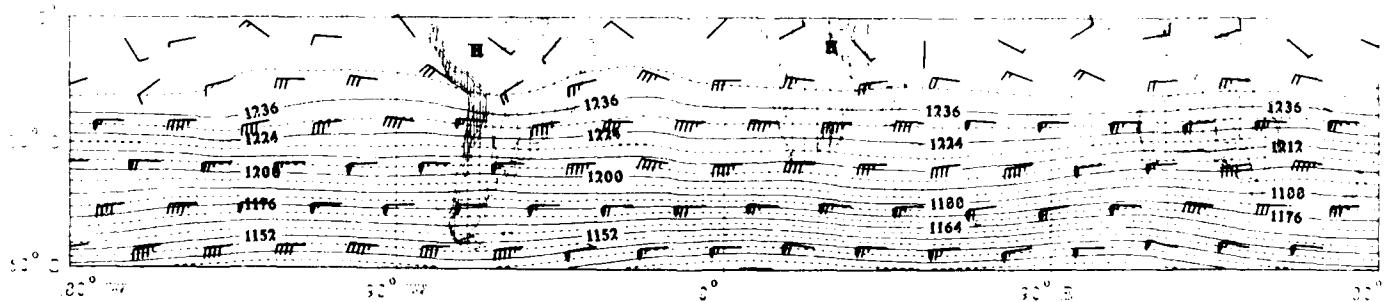
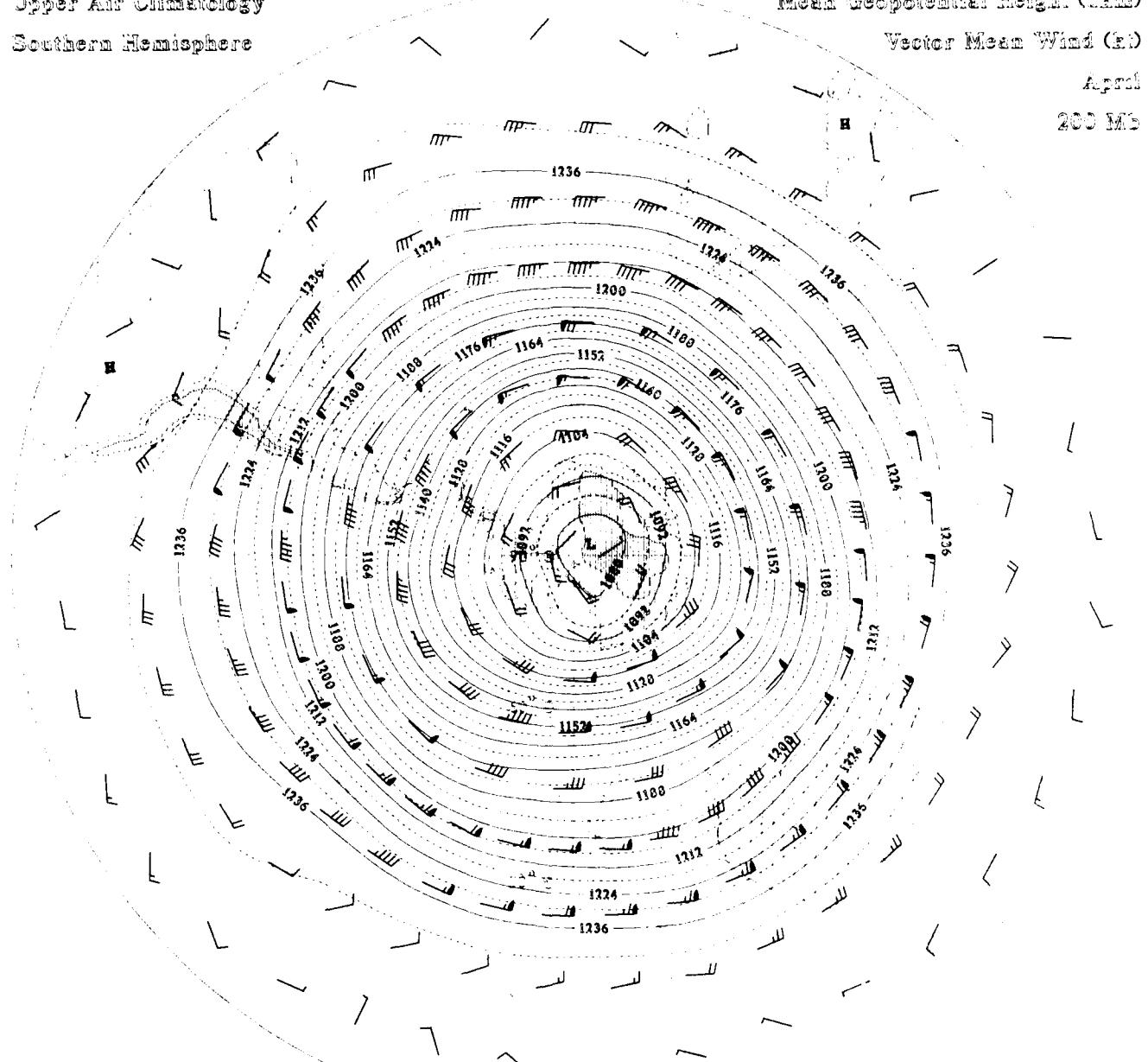
Upper Air Climatology Southern Hemisphere

Mean Geopotential Height (dms)

Vector Mean Wind (z)

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200 MB

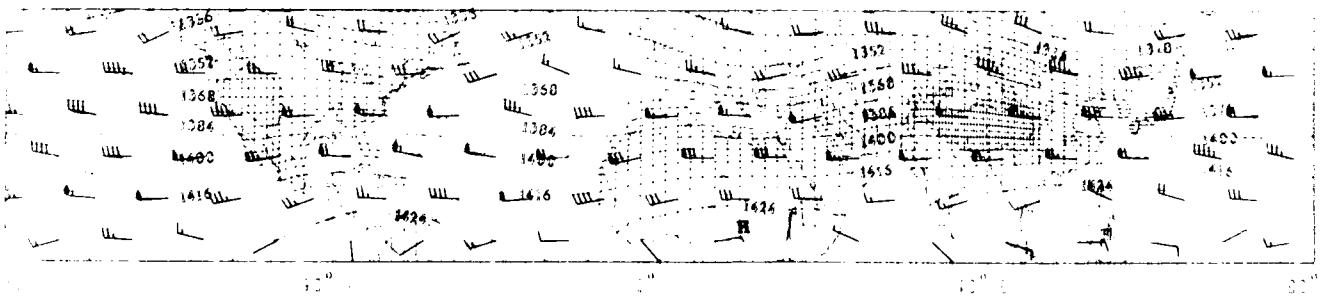
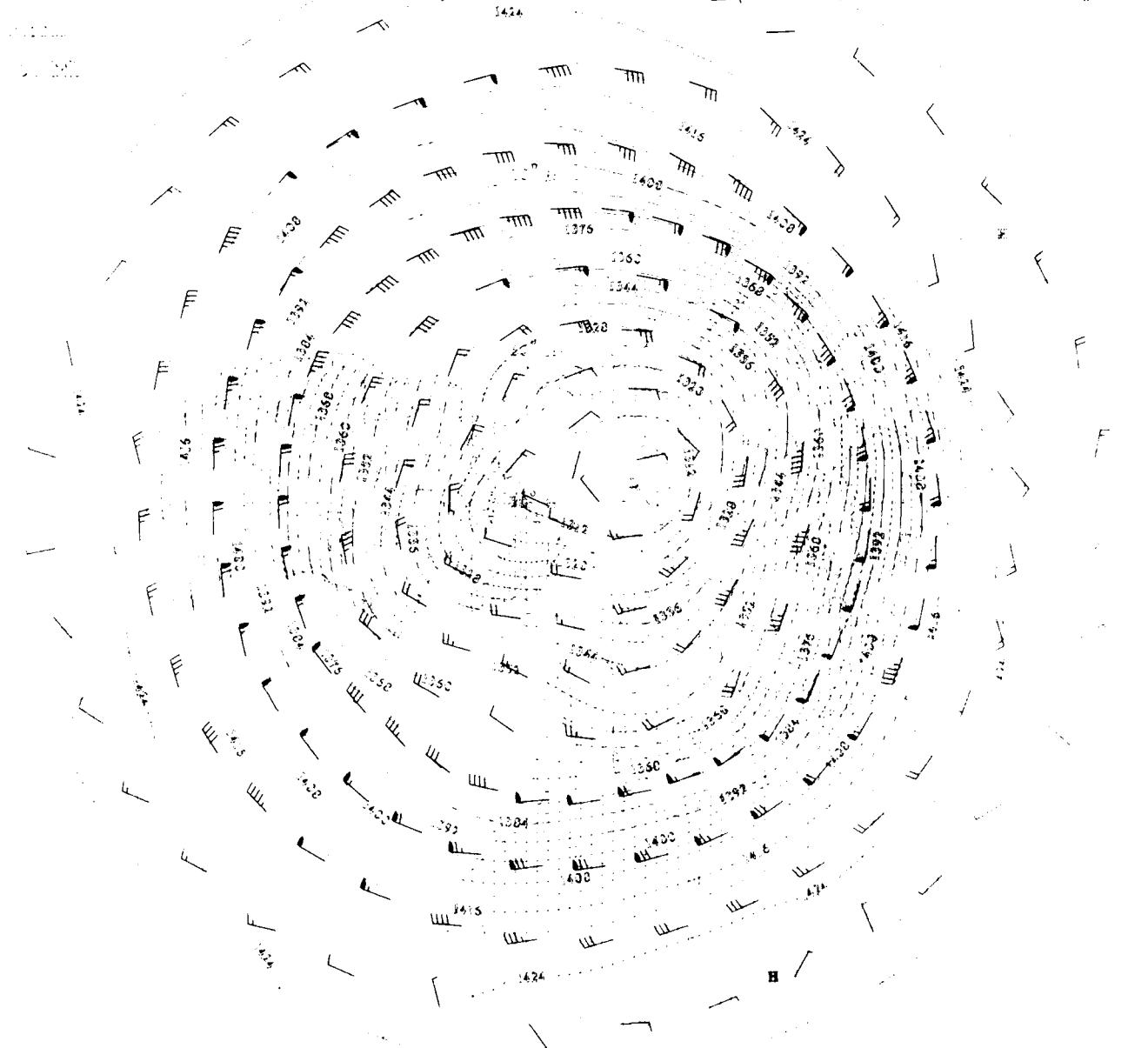


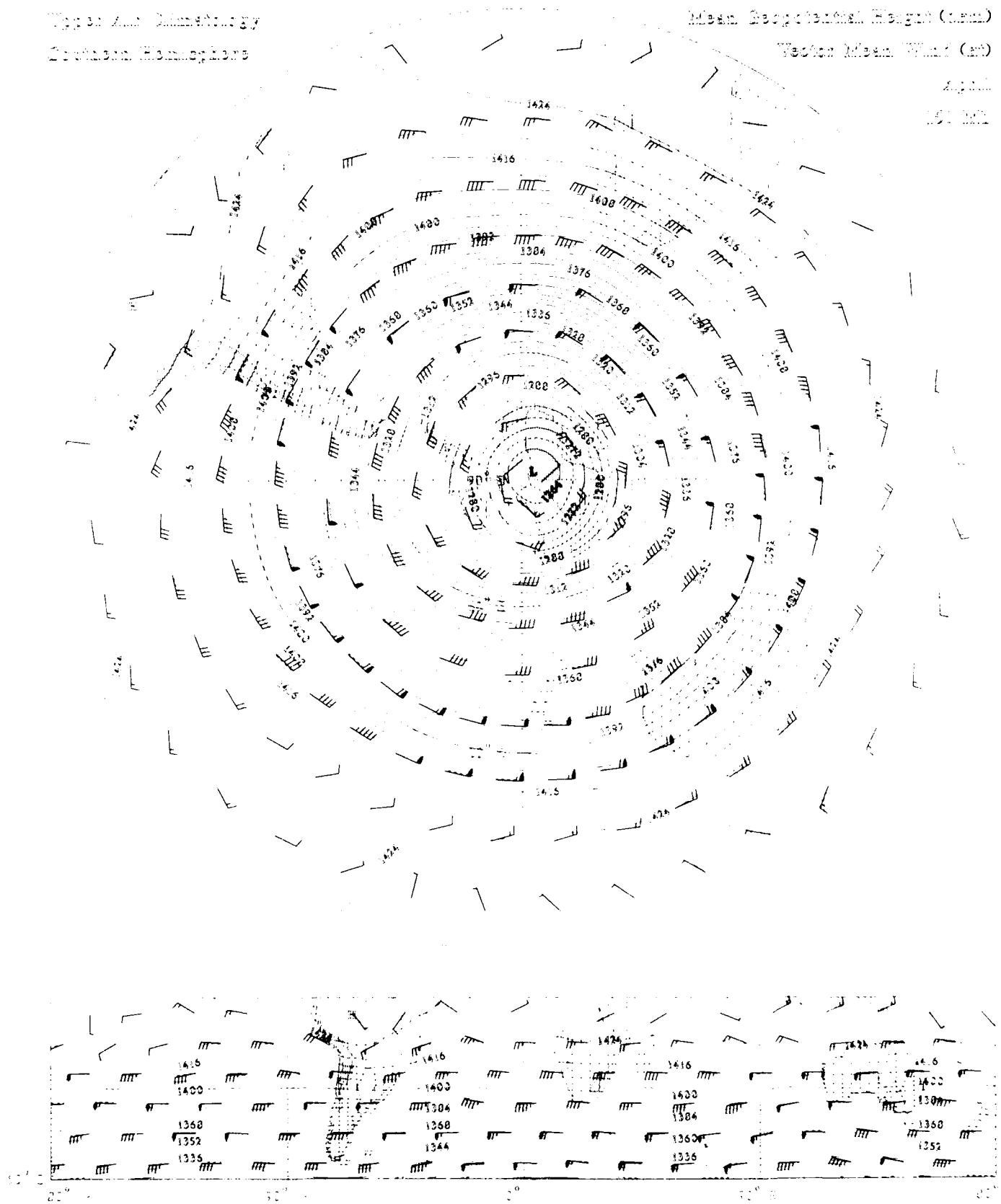
Water Permeation Height (mm)

Water Permeation (cm)

Water Permeation

Water Permeation



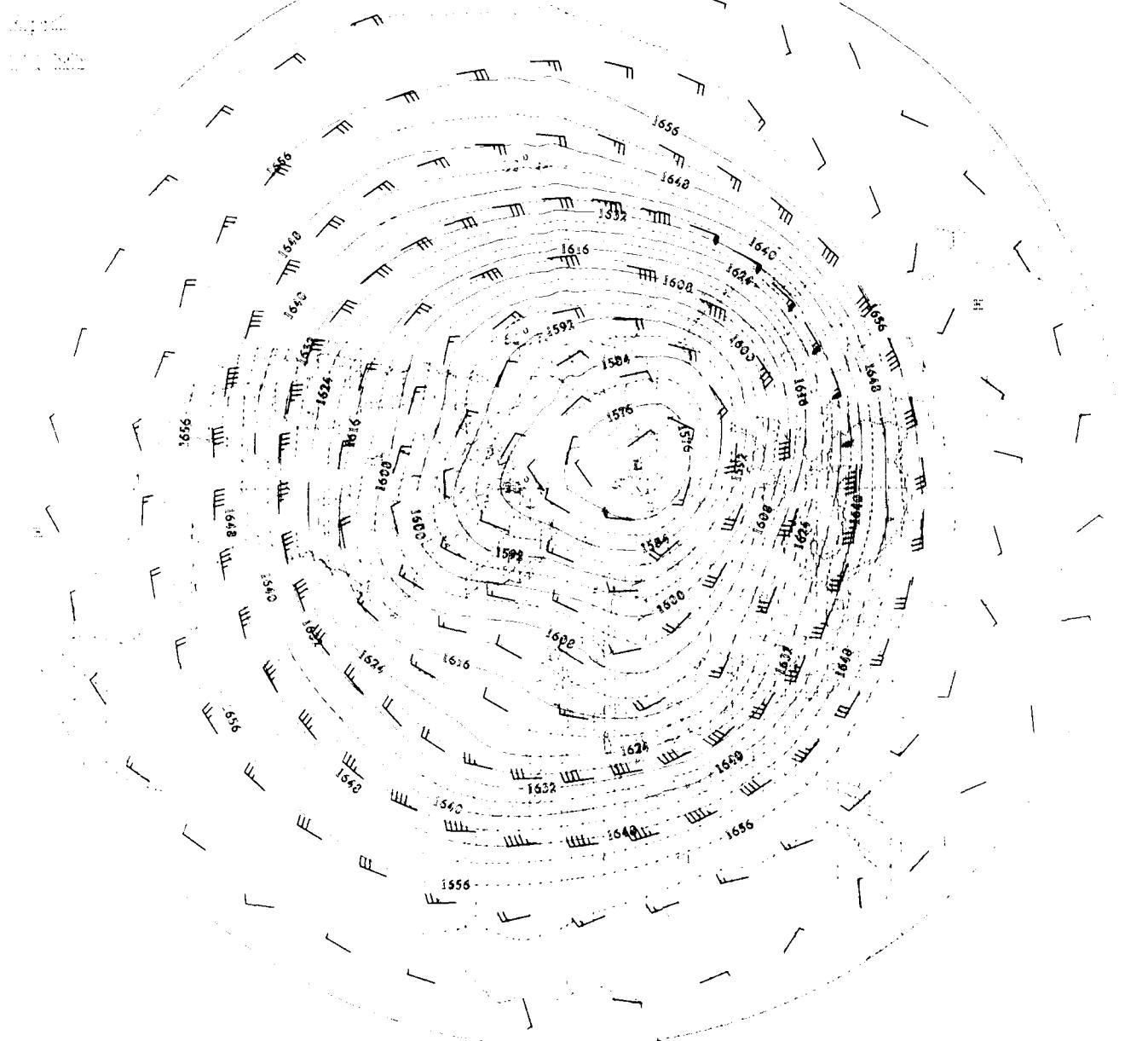


Mean Geopotential Height (GKm)

Vector Mean Wind (ms)

Upper Air Climatology

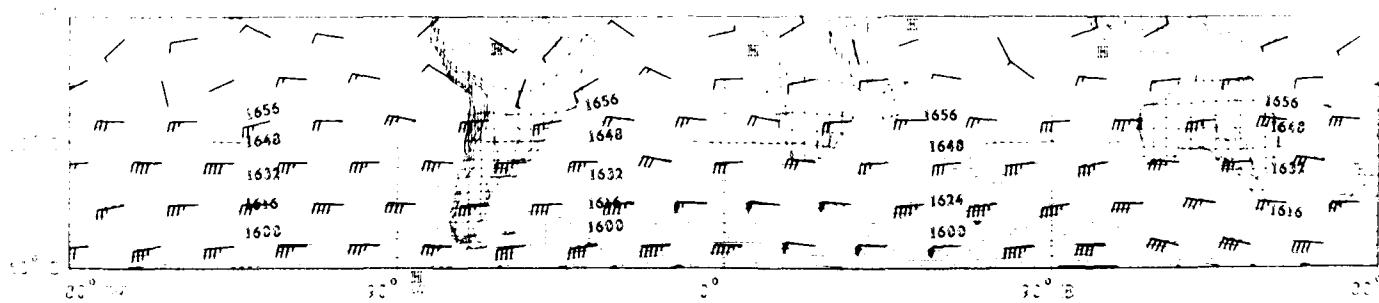
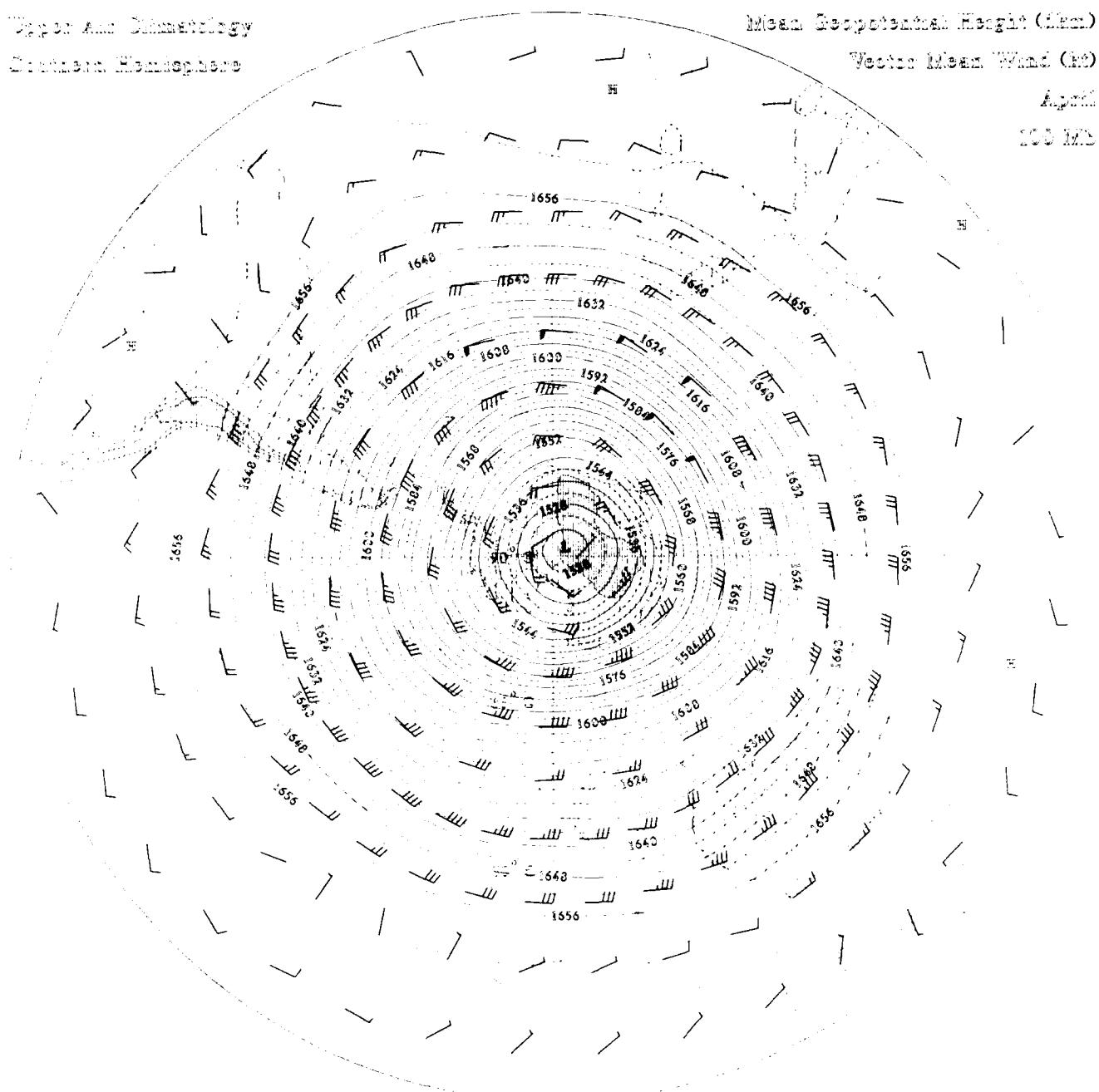
Northern Hemisphere



Topography

North America

Mean Geopotential Height (Metres)



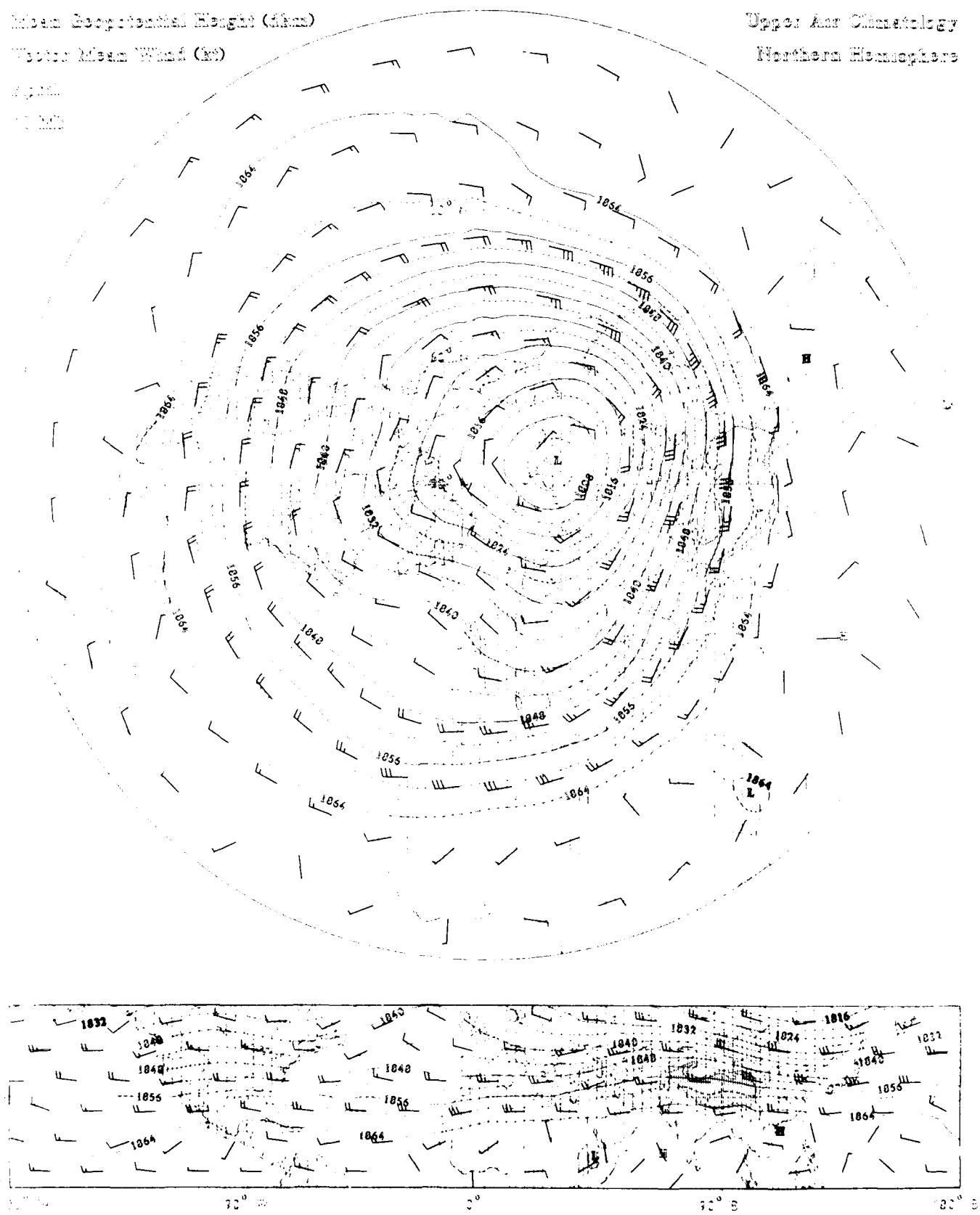


Fig. 27. Mean Climatology

of Northern Hemisphere

Mean Geopotential Height (cm)

Vector Mean Wind (cm)

1000 mb

700 mb

500 mb

300 mb

200 mb

100 mb

850 mb

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600 mb

Mean Geopotential Height (dkm)

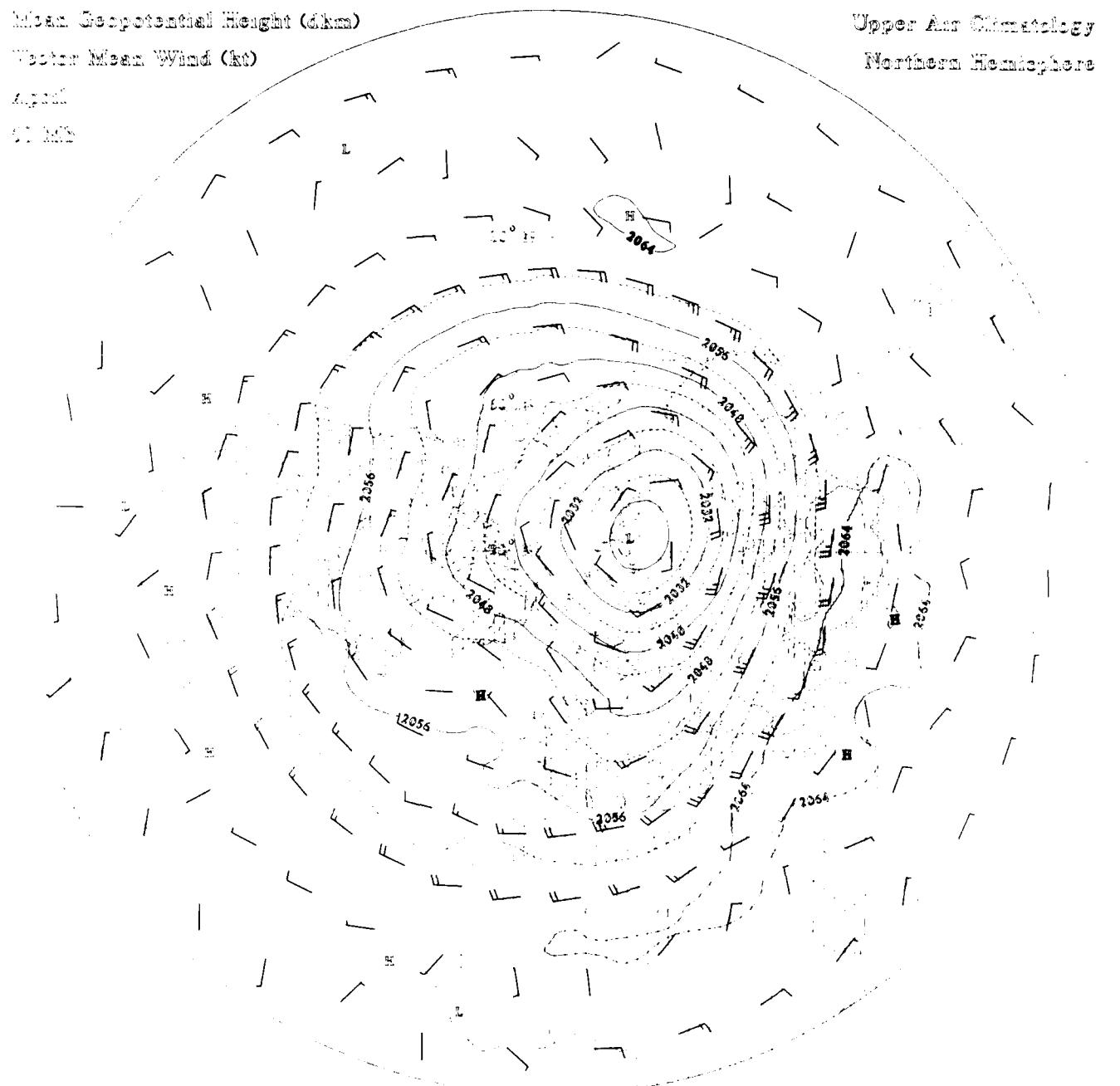
Vector Mean Wind (kt)

1000 mb

500 mb

Upper Air Climatology

Northern Hemisphere



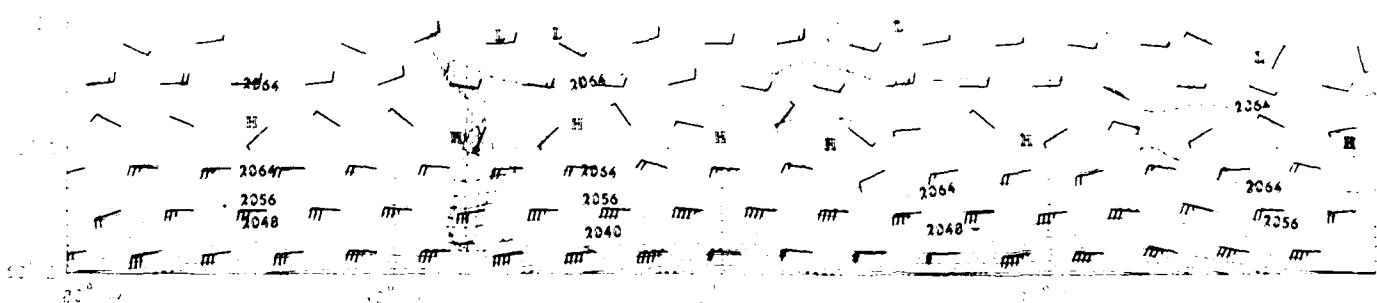
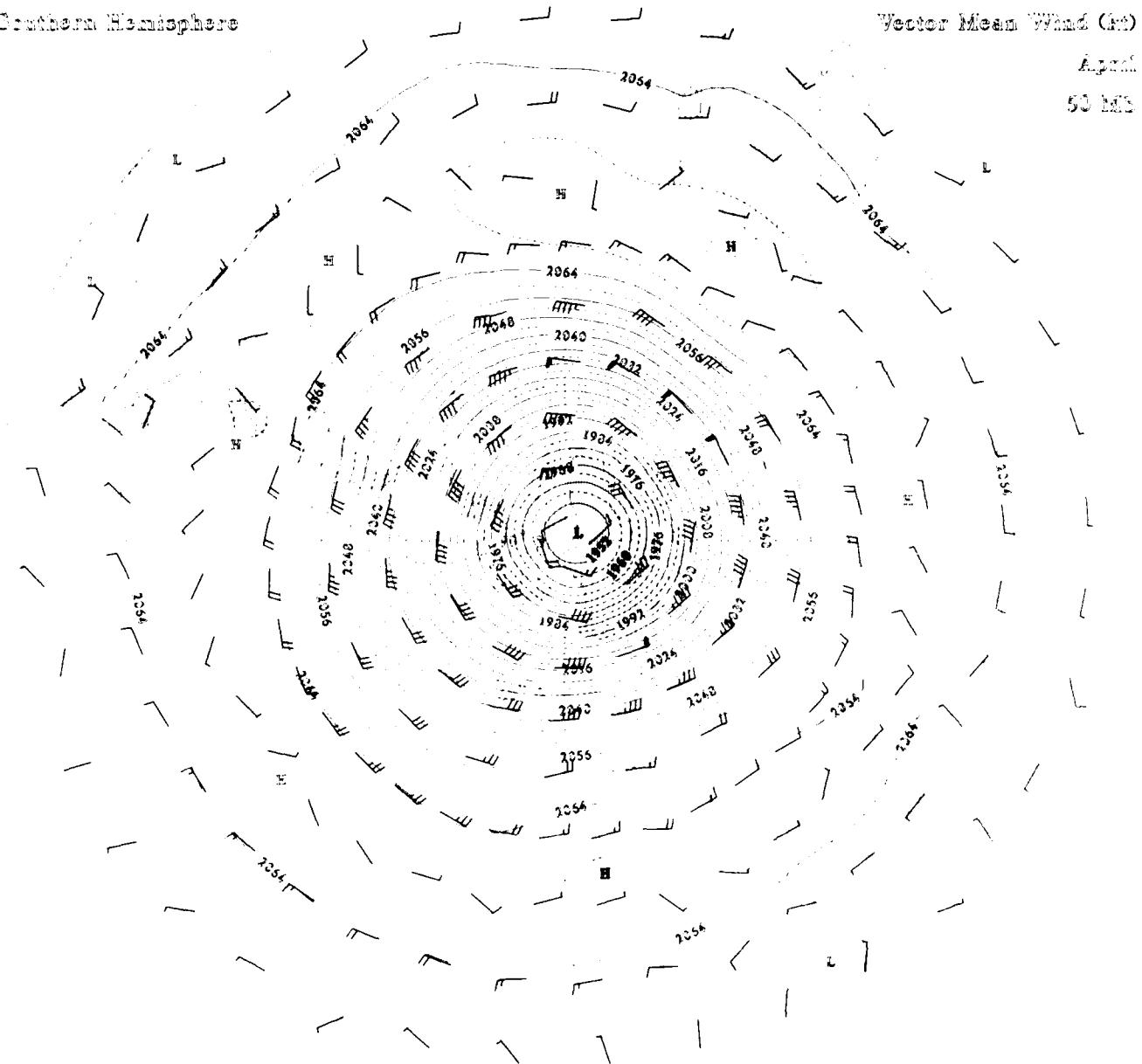
Upper Air Climatology
Southern Hemisphere

Mean Geopotential Height (km)

Vector Mean Wind (kt)

Aug

50 mb



Mean Geopotential Height (dkm)

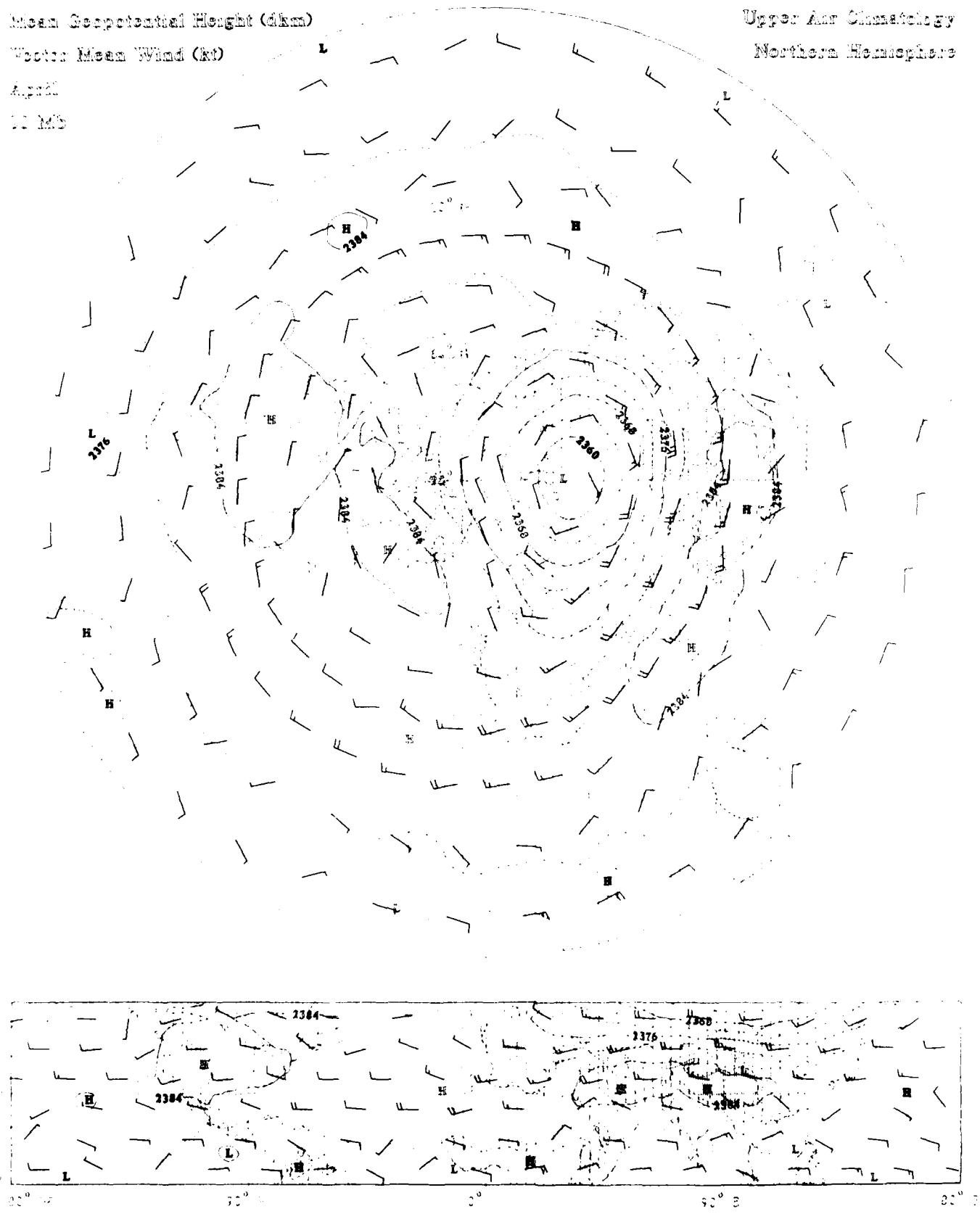
Vector Mean Wind (kt)

April

11 MB

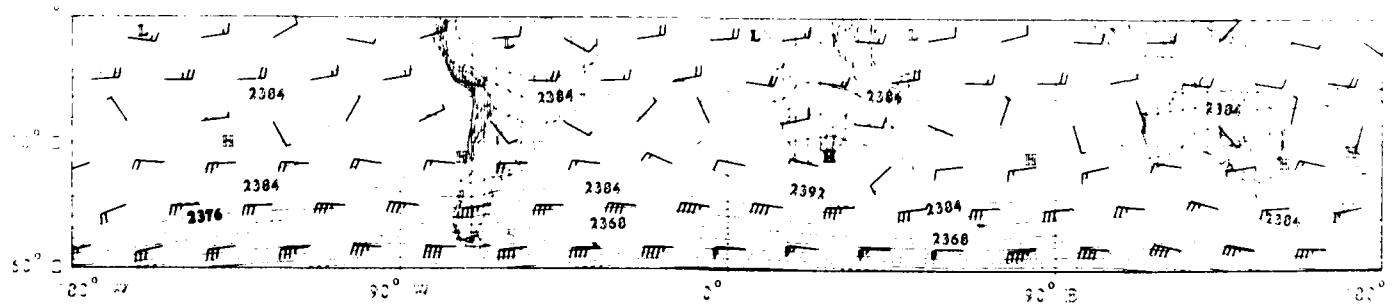
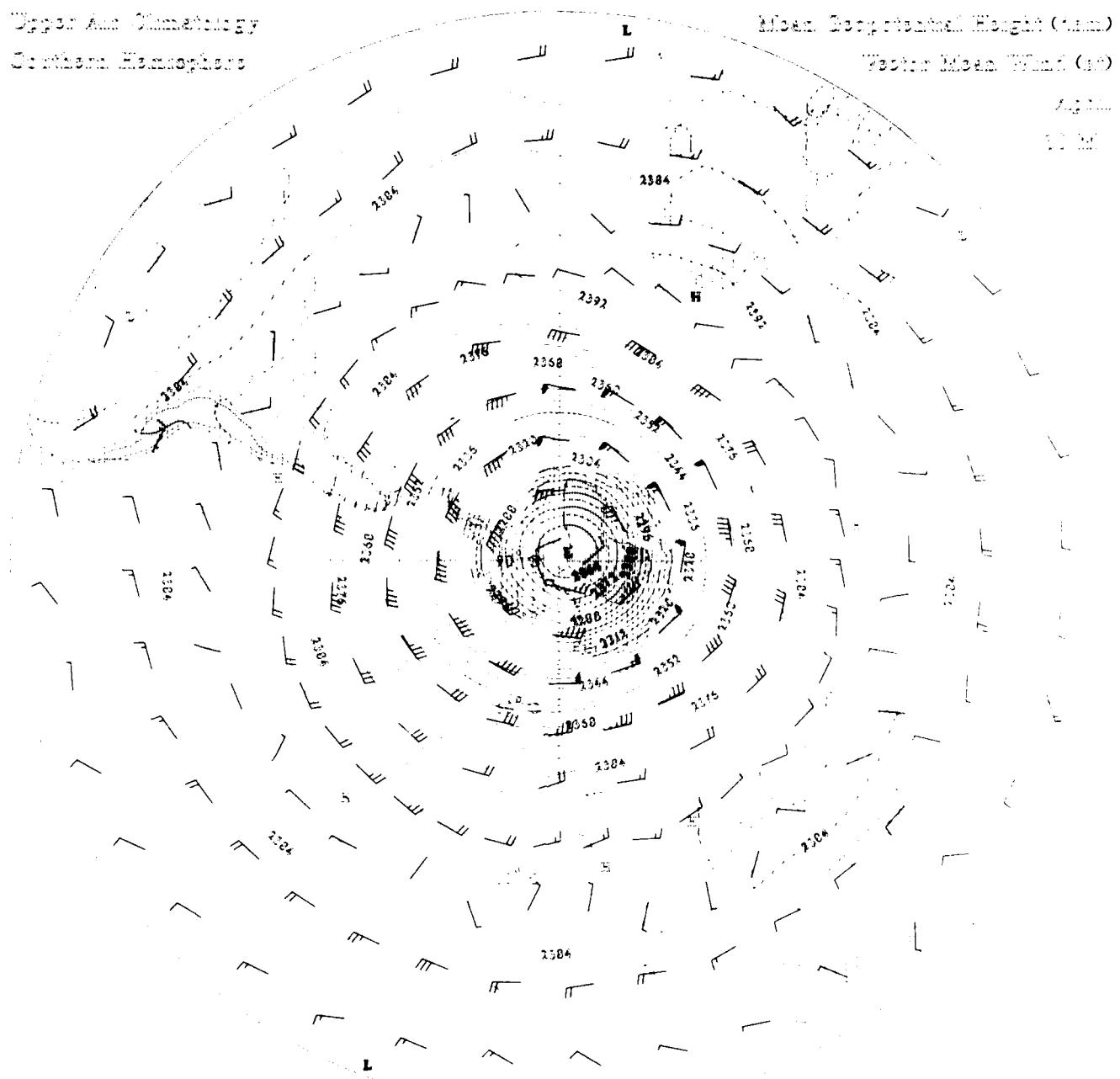
Upper Air Climatology

Northern Hemisphere



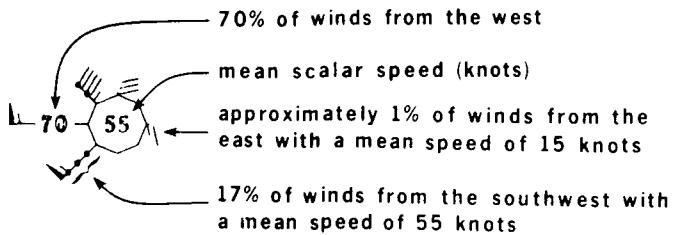
Upper Air Climatology
Southern Hemisphere

Mean Geopotential Height (cm)
Vector Wind (m)

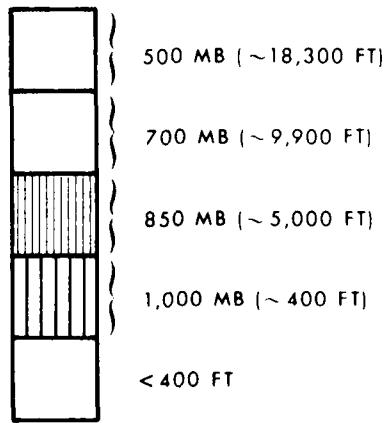


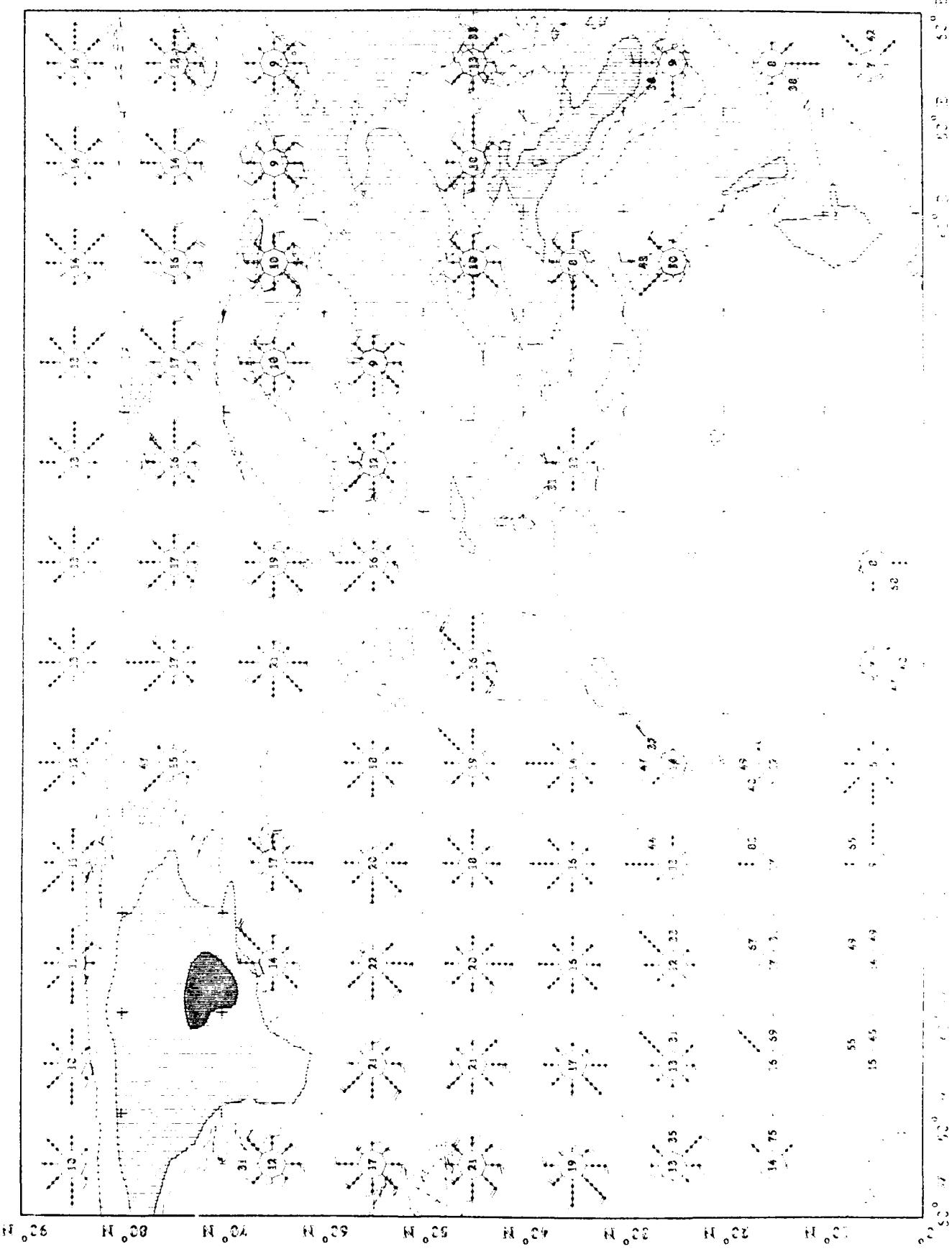
WIND ROSES
(13 LEVELS, 1000 TO 30 MB)

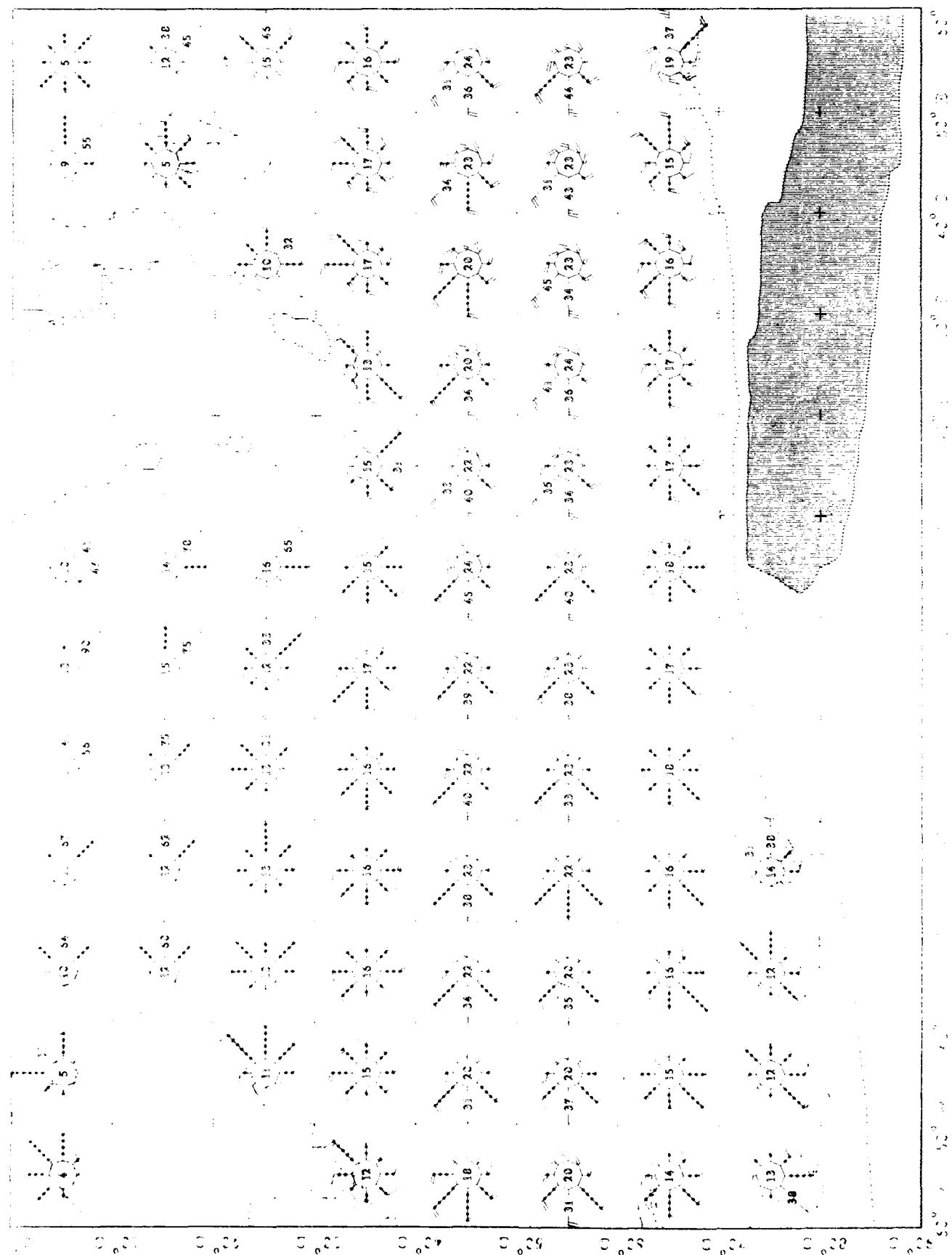
- Wind roses at 10 degree latitude/longitude grid points
- Directional mean wind speed in 5 knot increments
- Frequency proportional to barb length with individual dots representing 5% increments. Values greater than 30% are plotted directly on the barb.
- Roses blanked at grid points with elevations exceeding specified geopotential heights.
- Sample rose explanation:



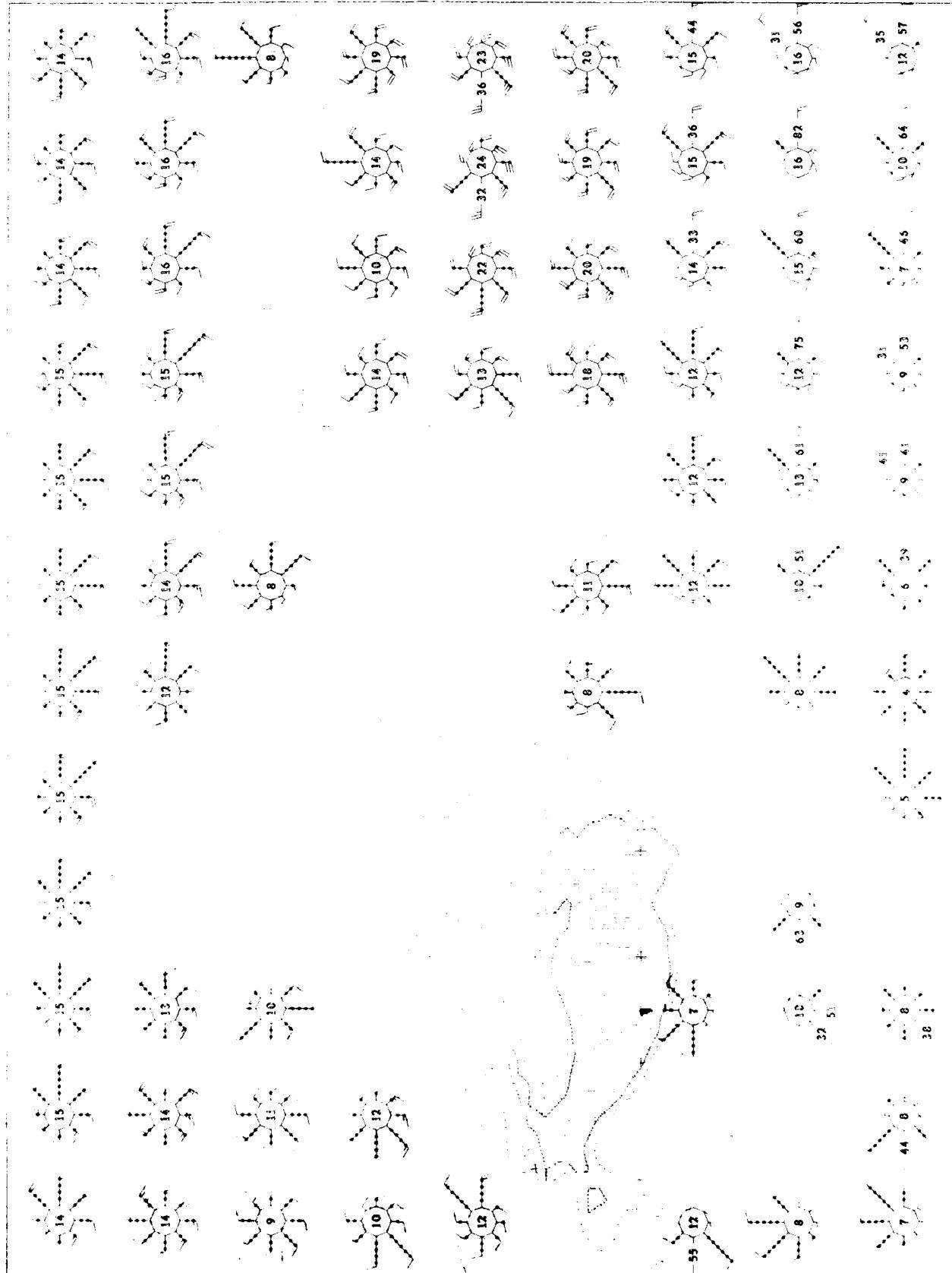
ELEVATION SCALE

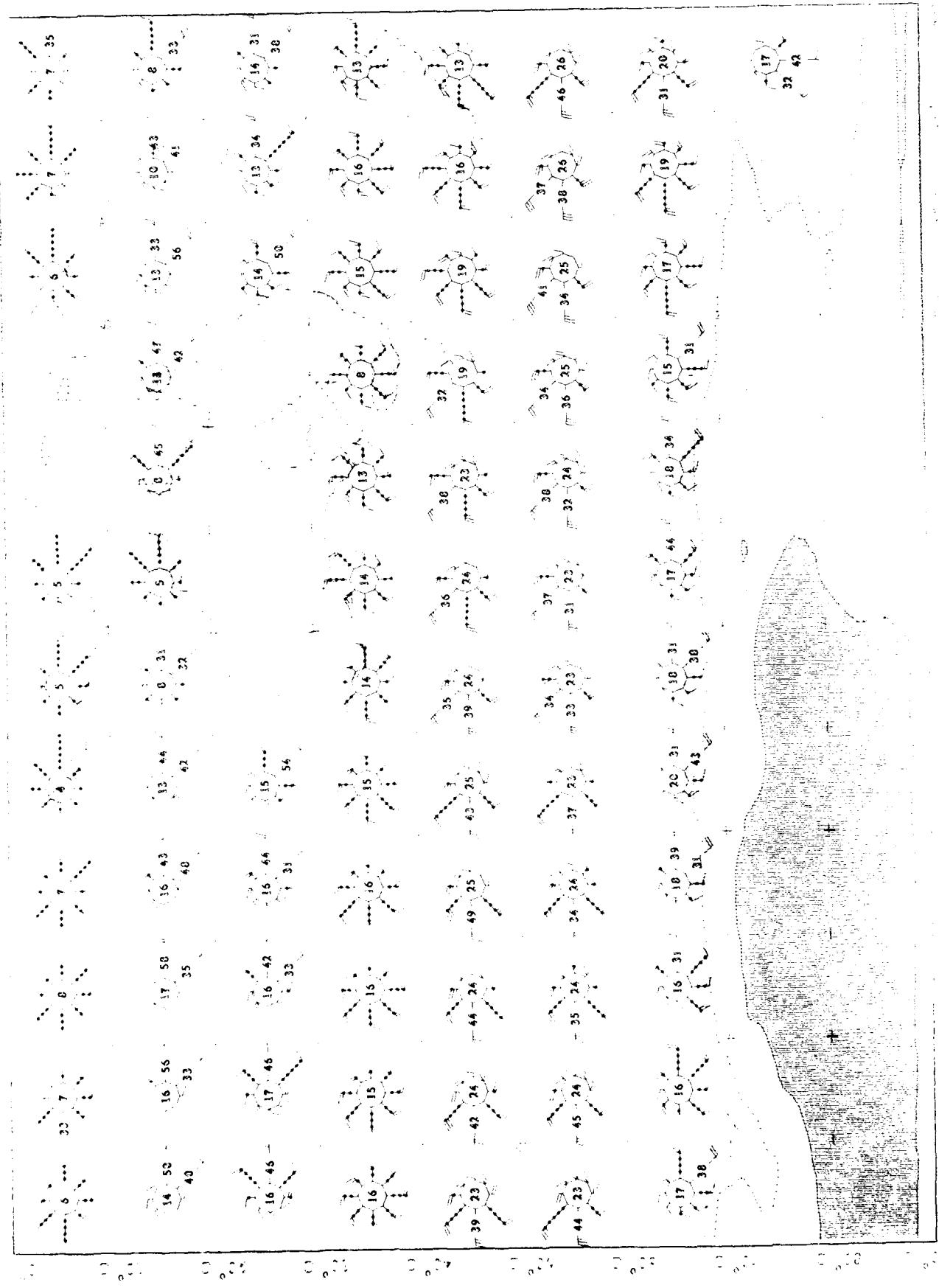


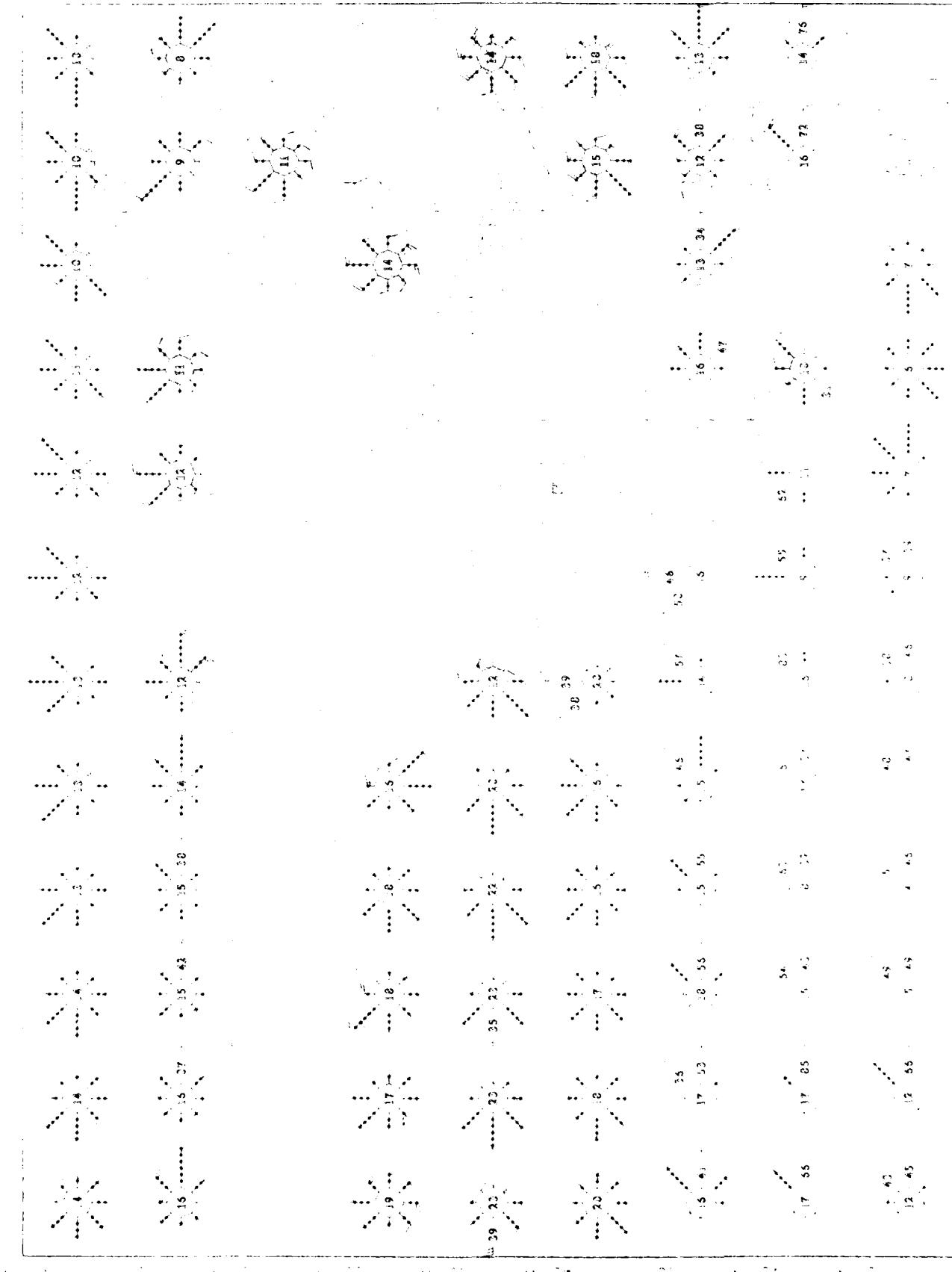


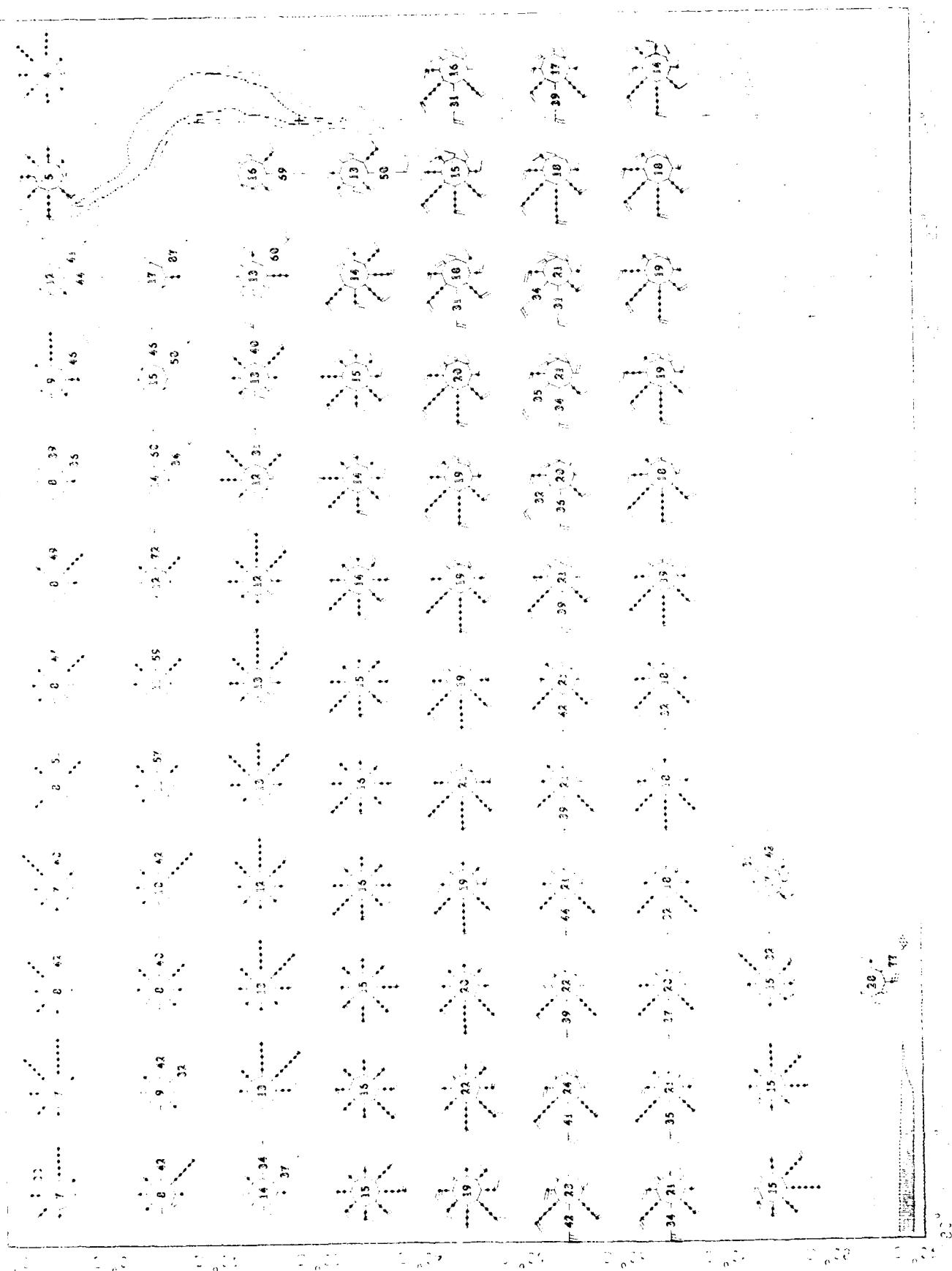


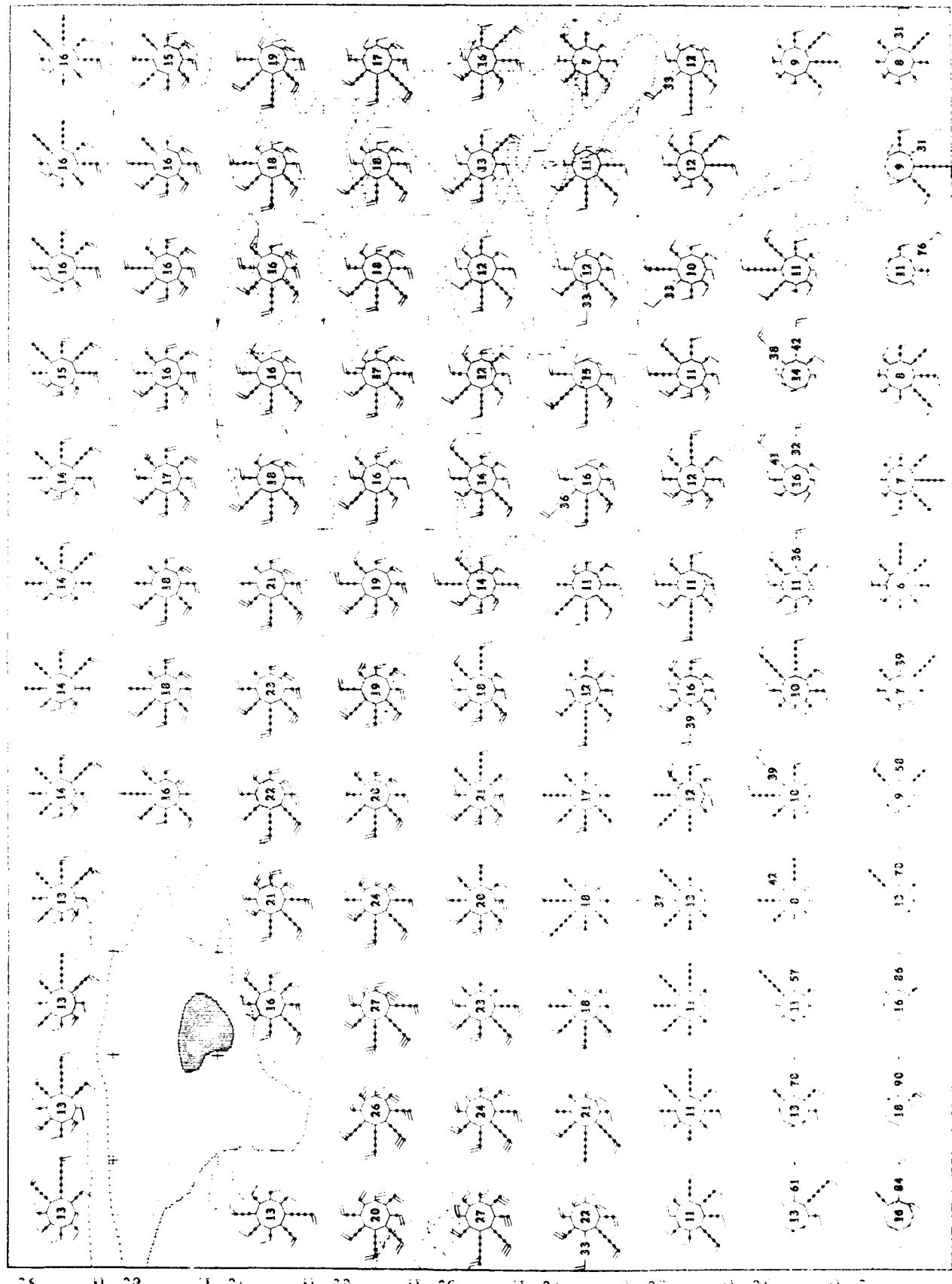
MAP OF EARTH
TO SCALE
1:10,000,000
10° N. LAT.
10° S. LAT.
10° E. LONG.
10° W. LONG.

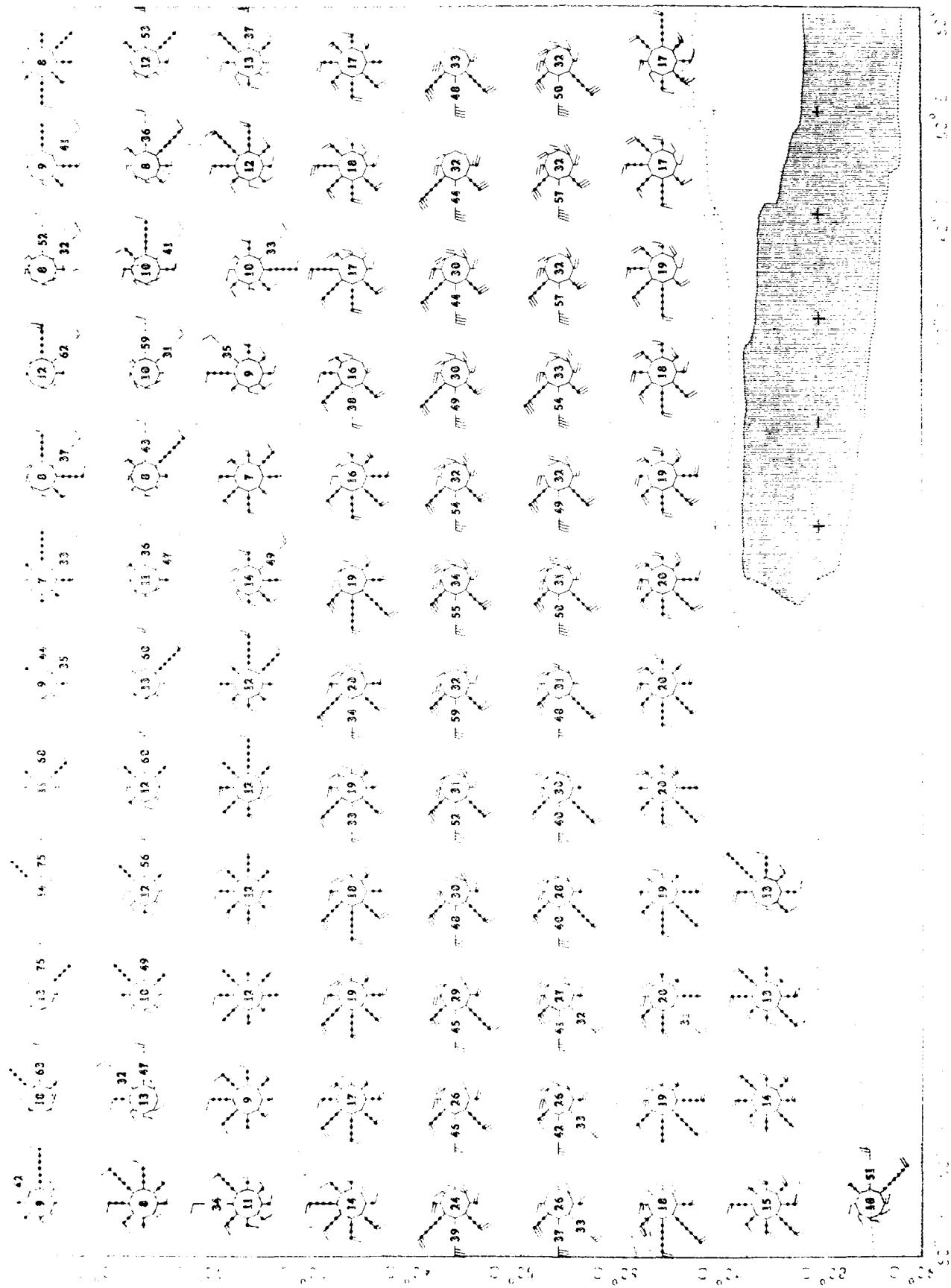


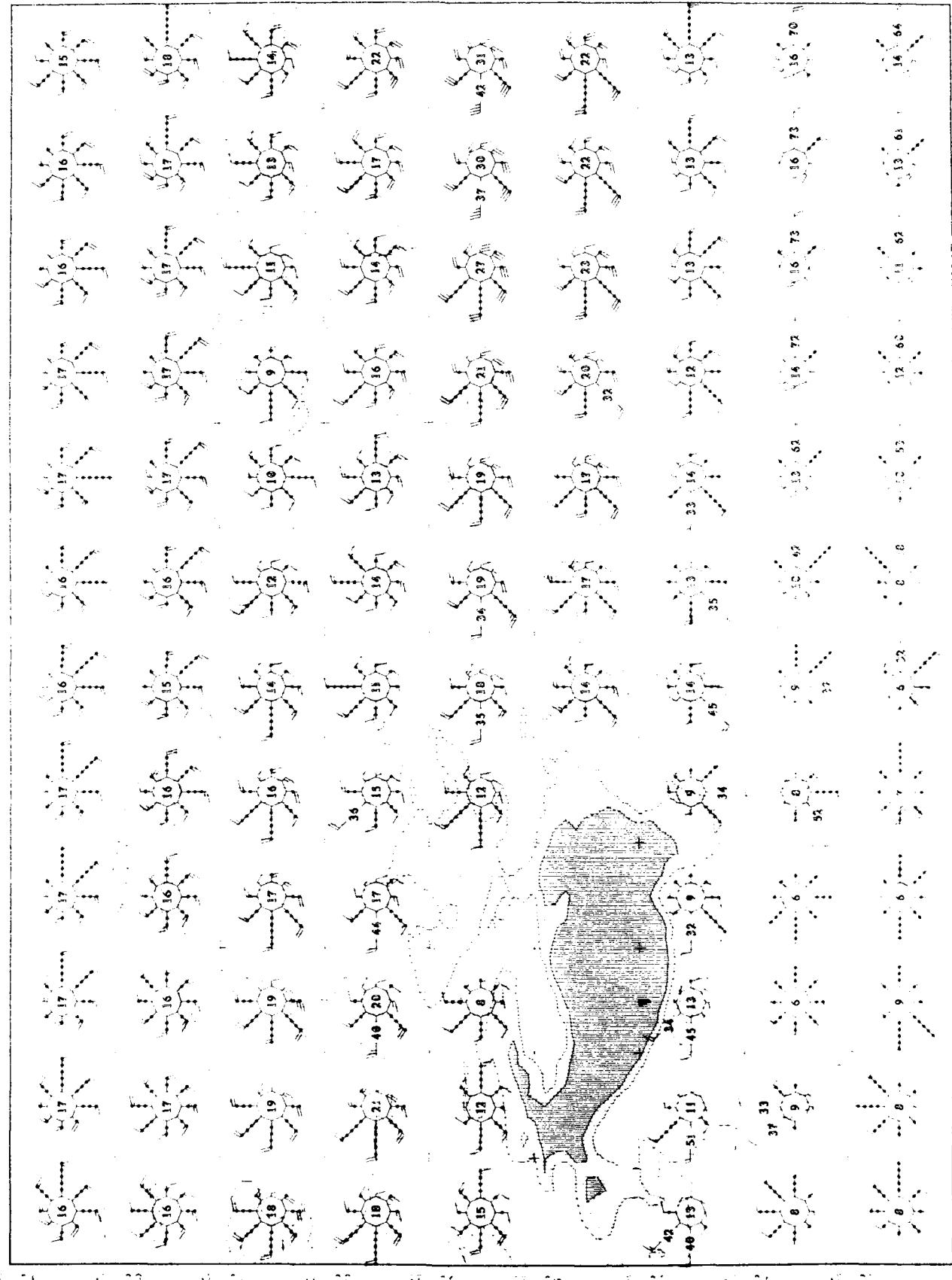








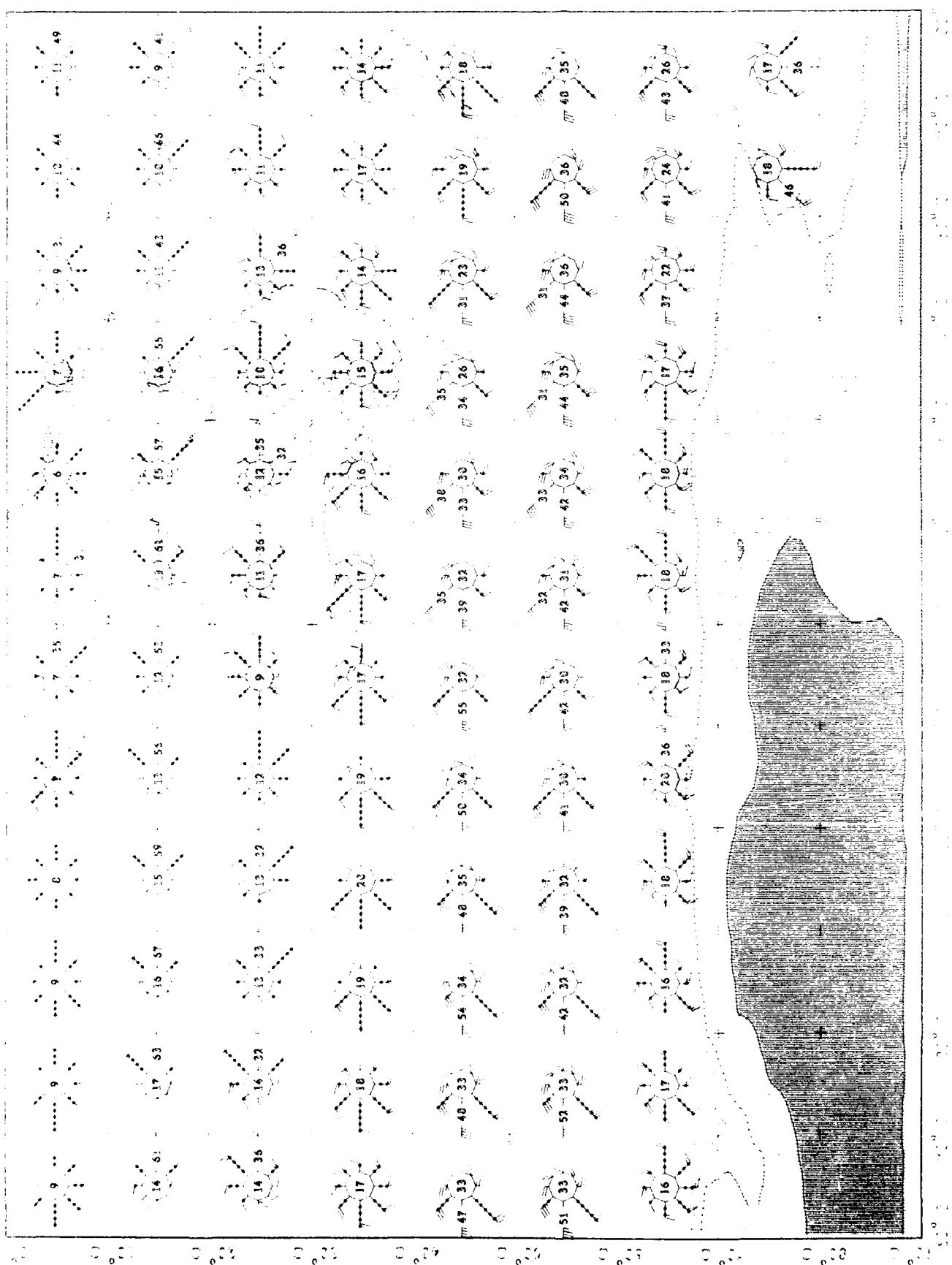


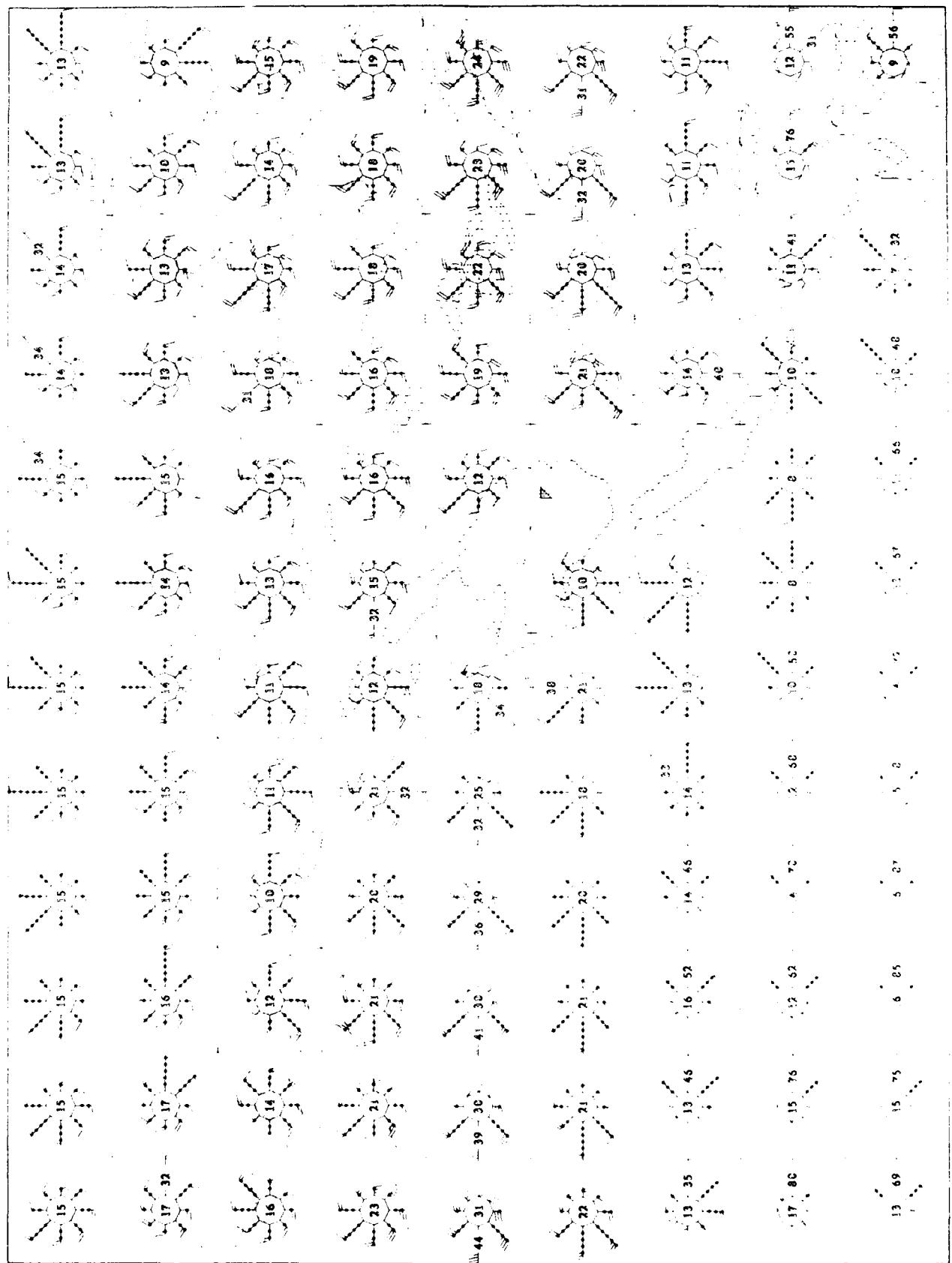


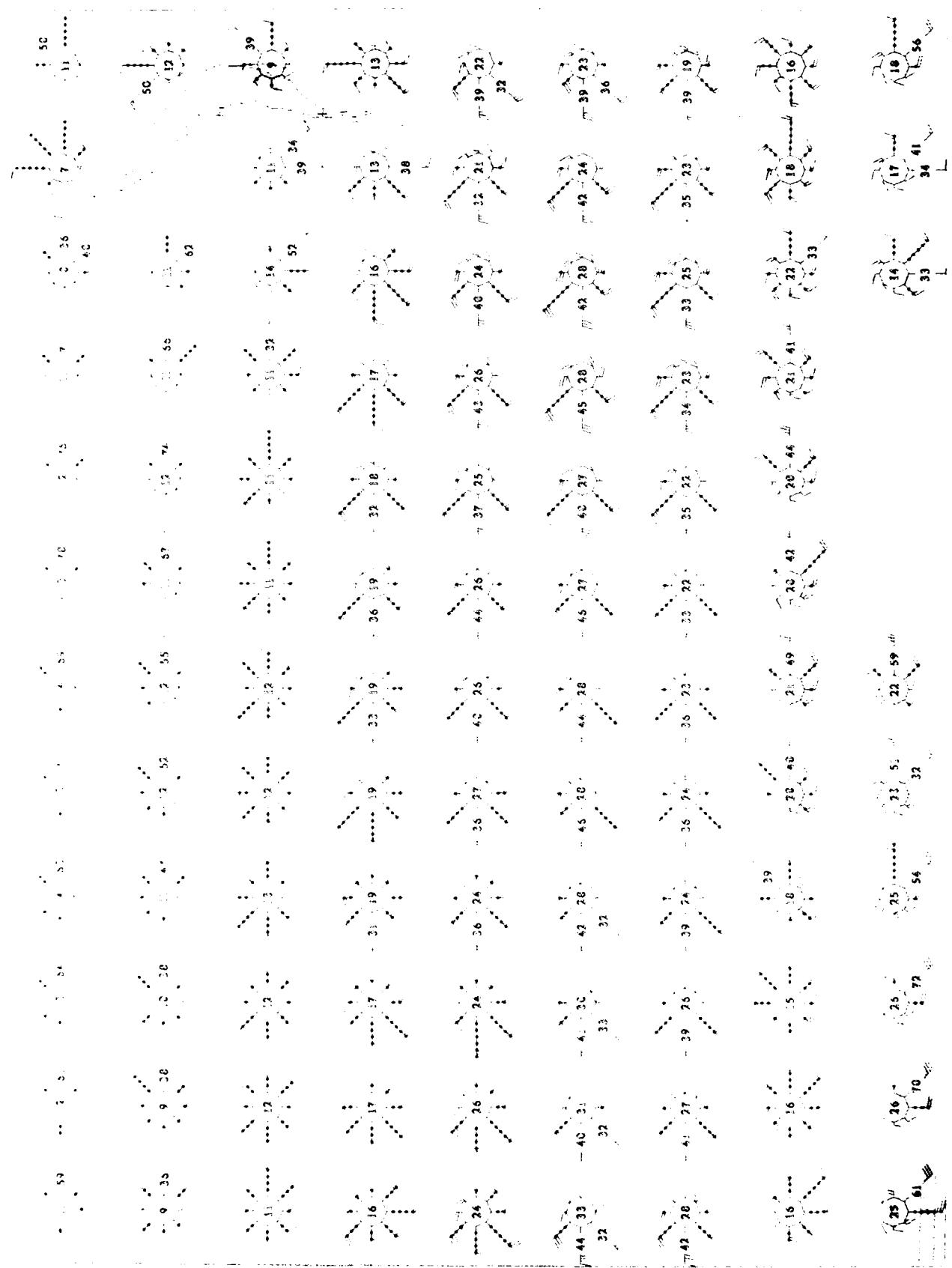
WILSON'S BIRDS OF THE PHILIPPINE ISLANDS
Vol. 2, Part 2, No. 2, 1902.

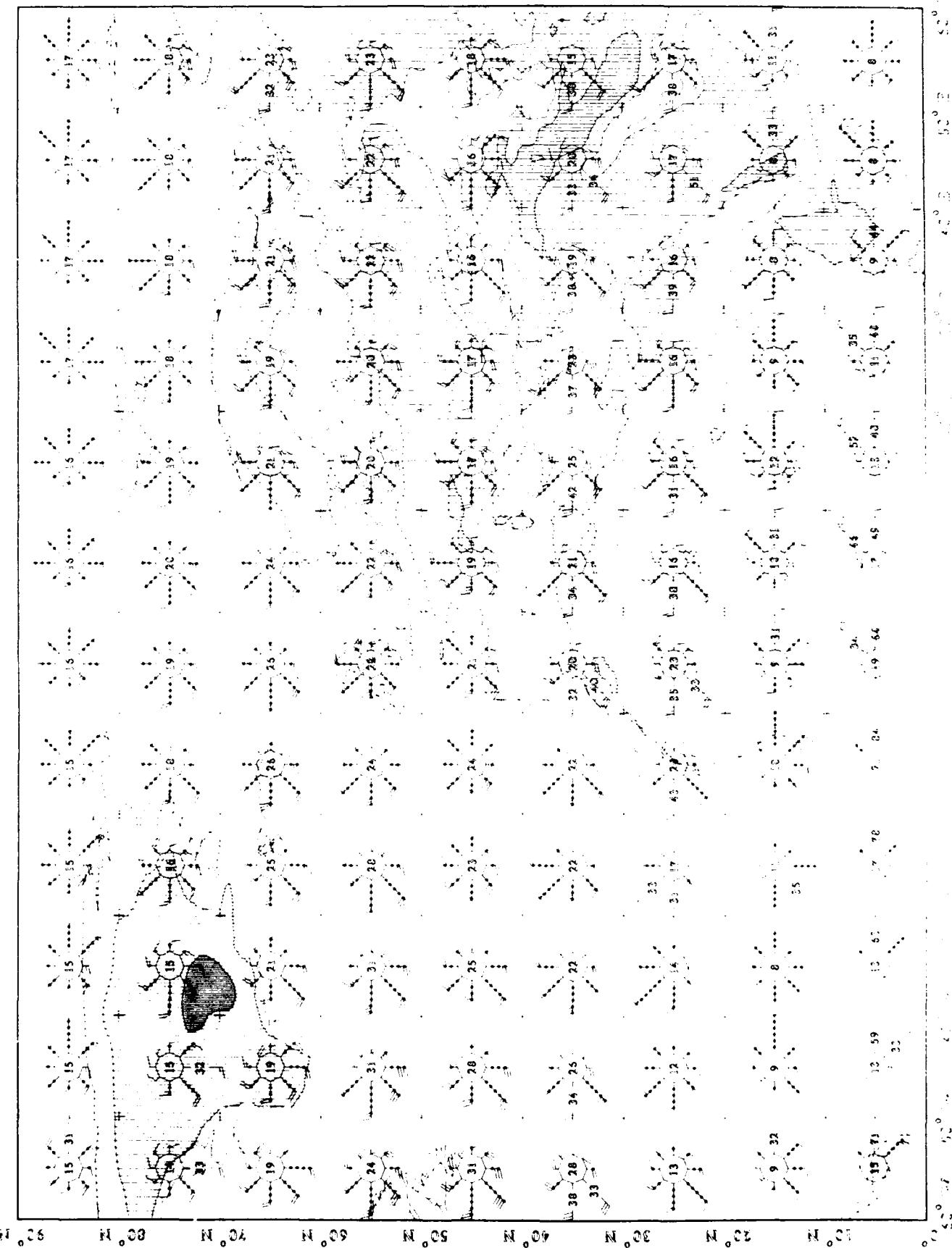
PLATE 39

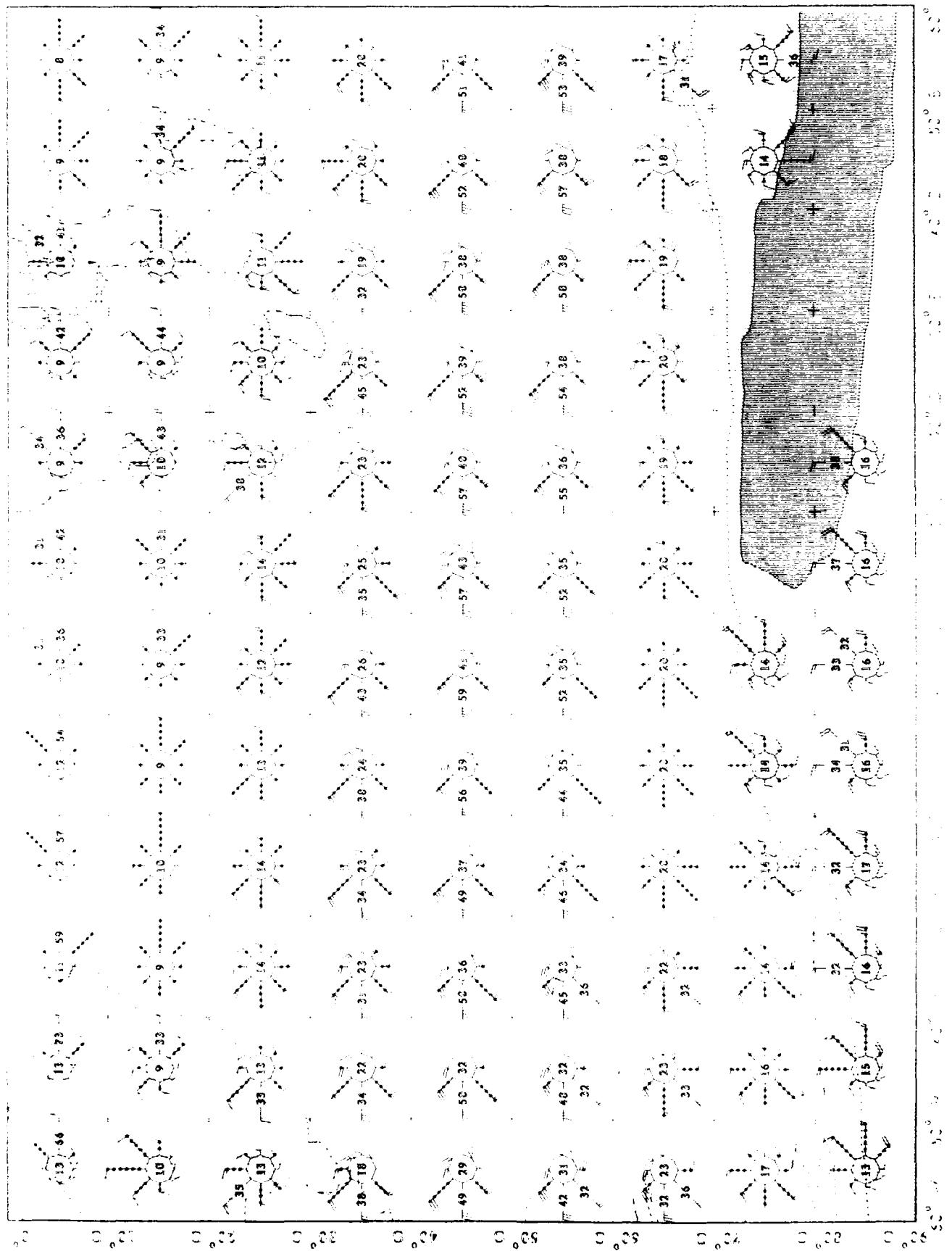
261 Spec.

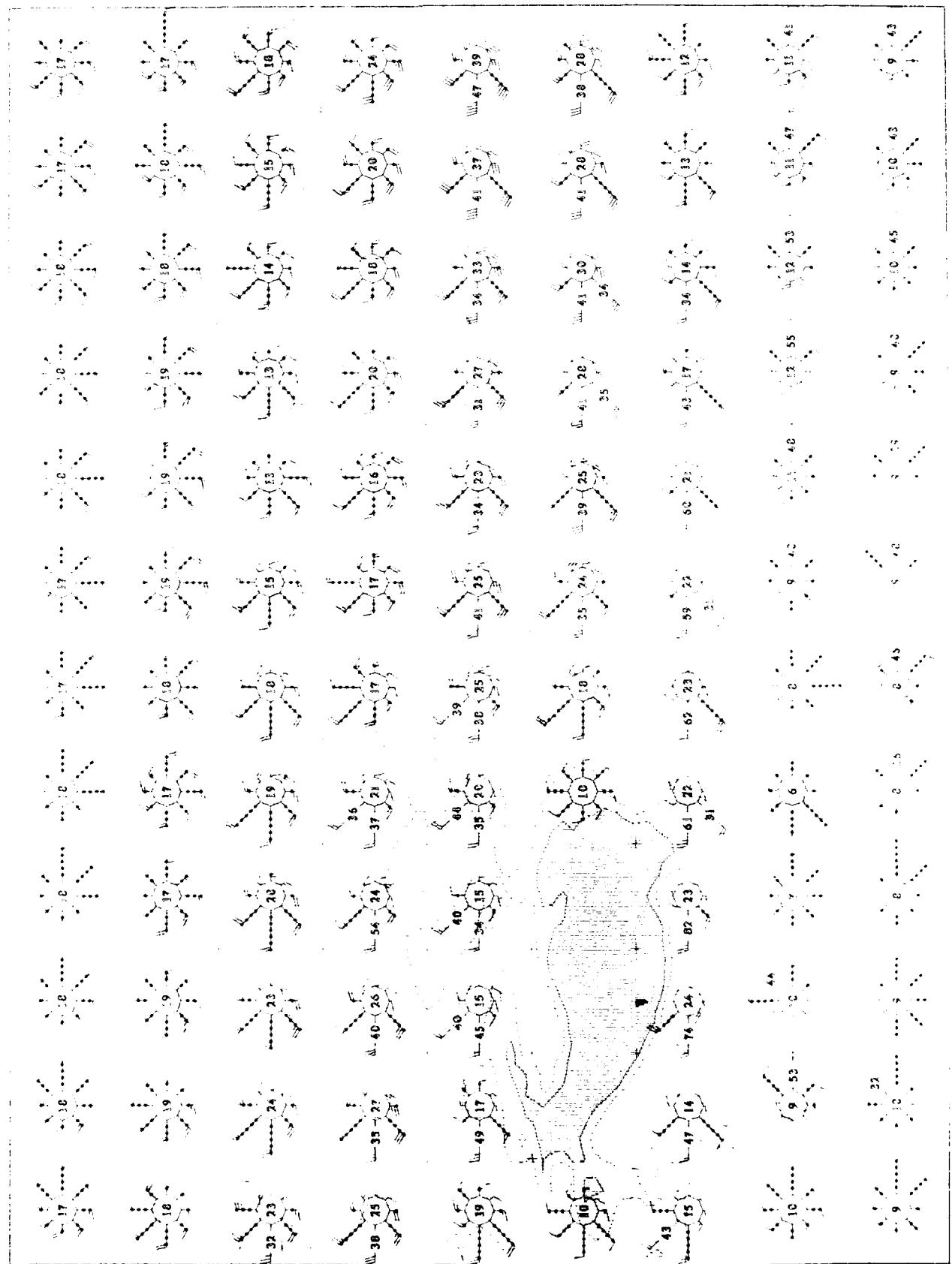


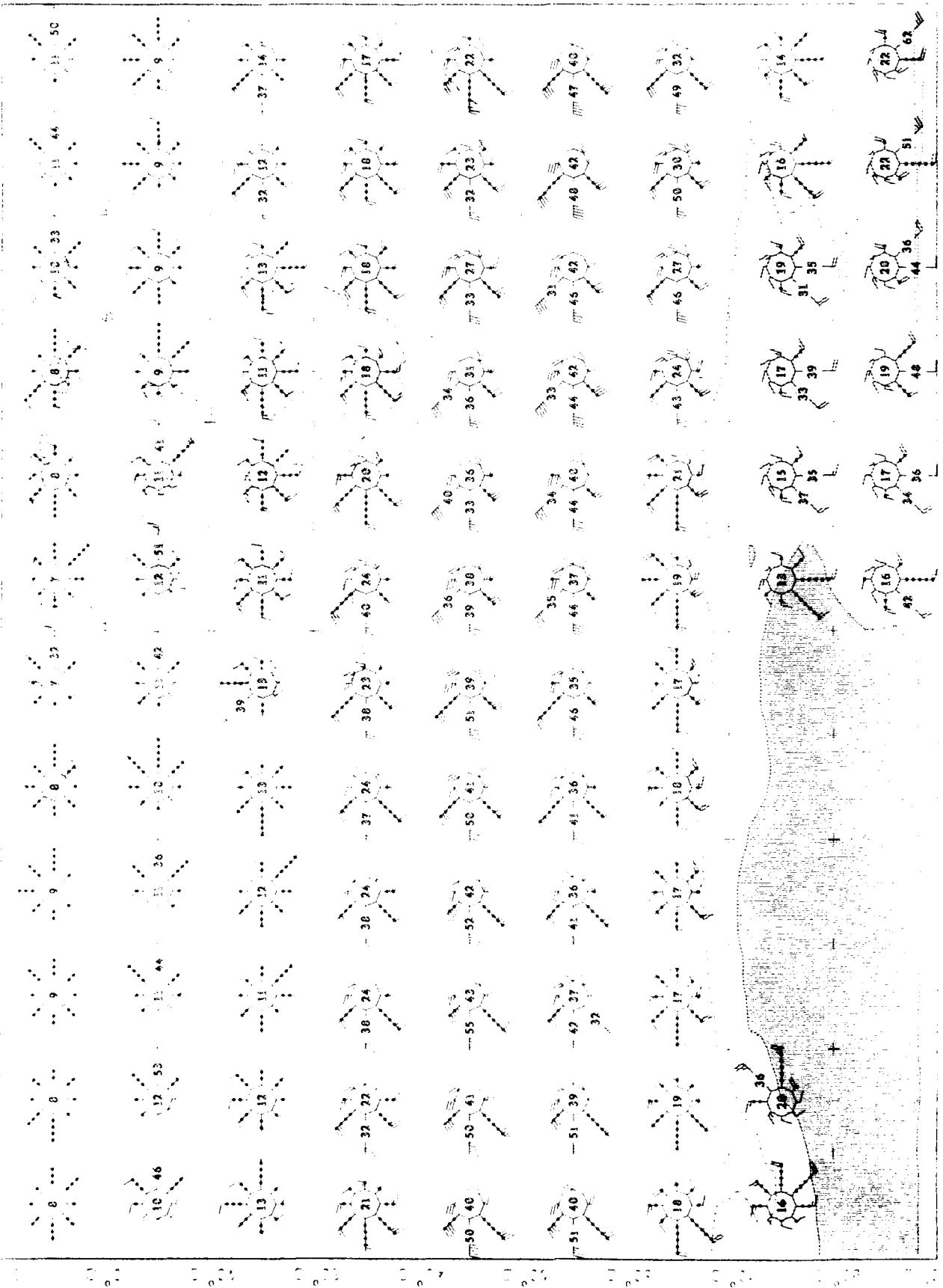


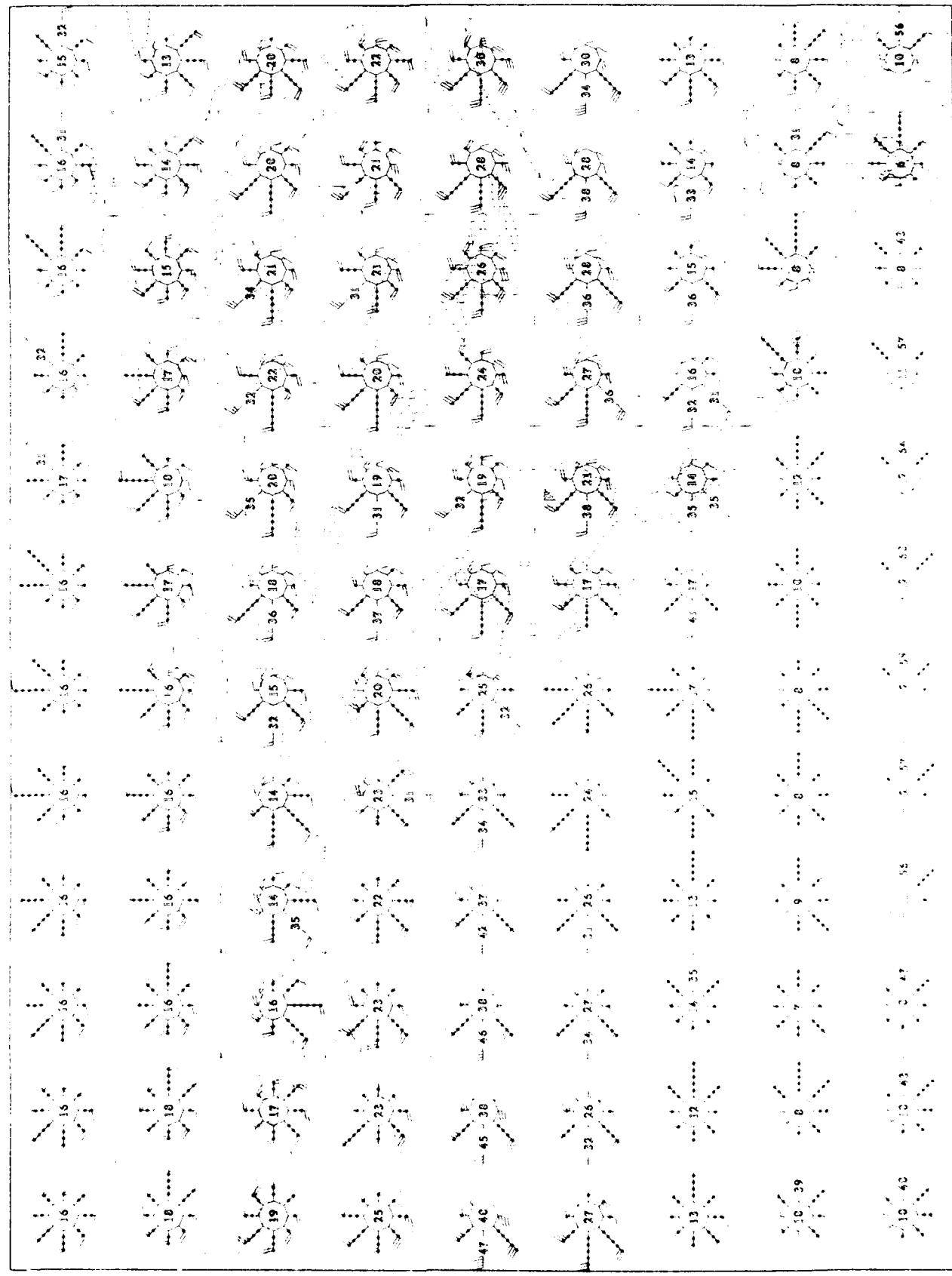


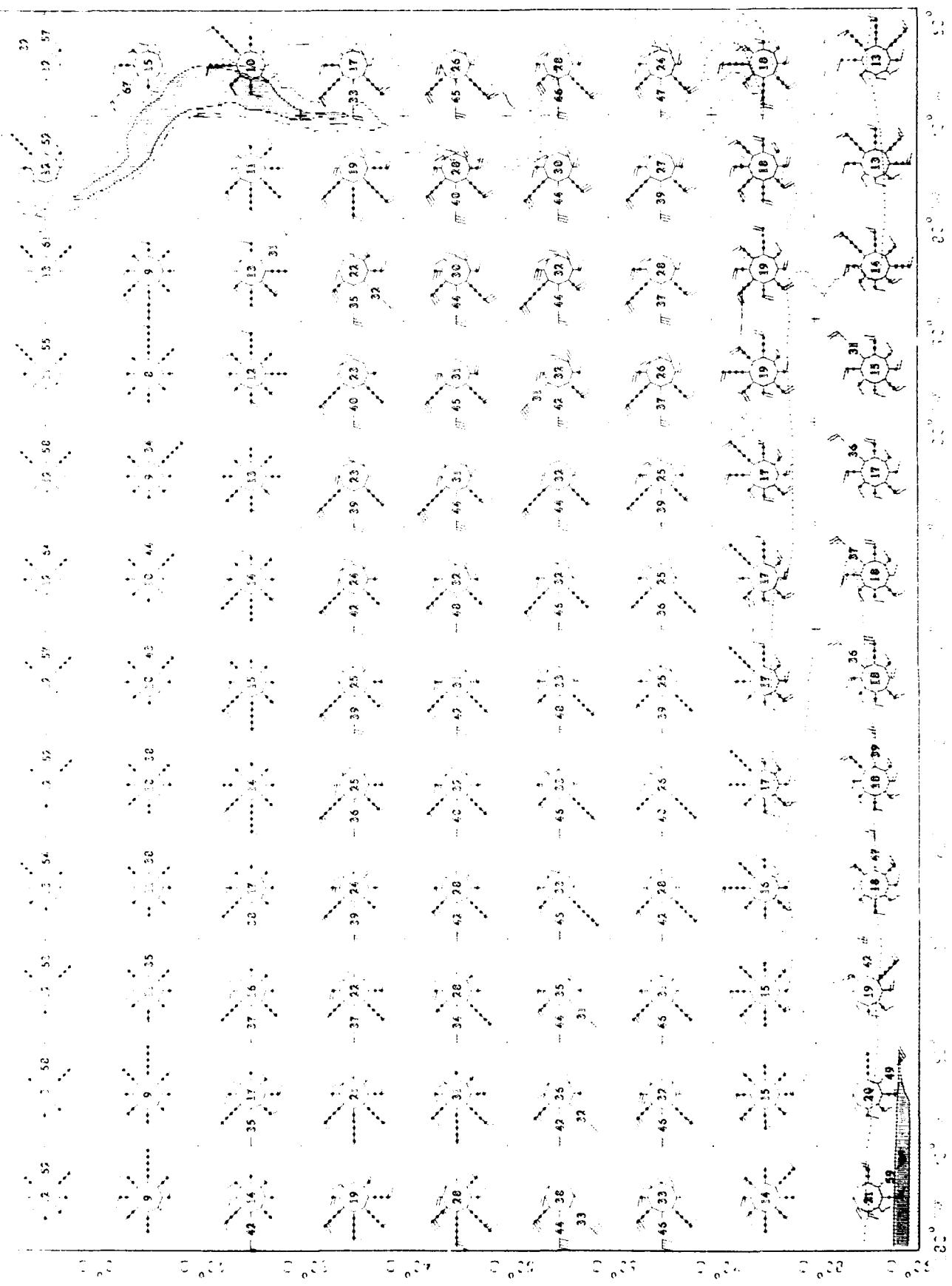


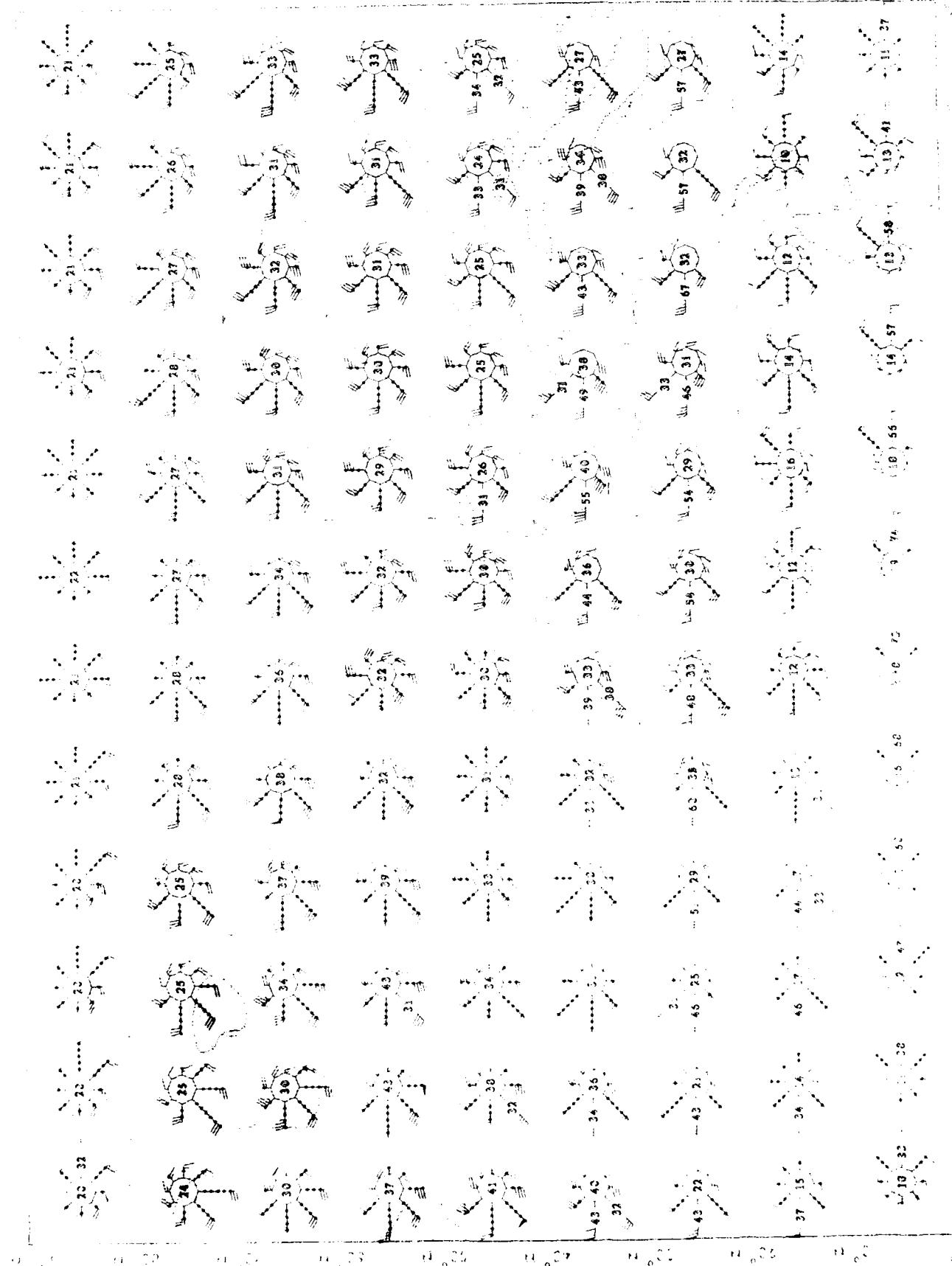


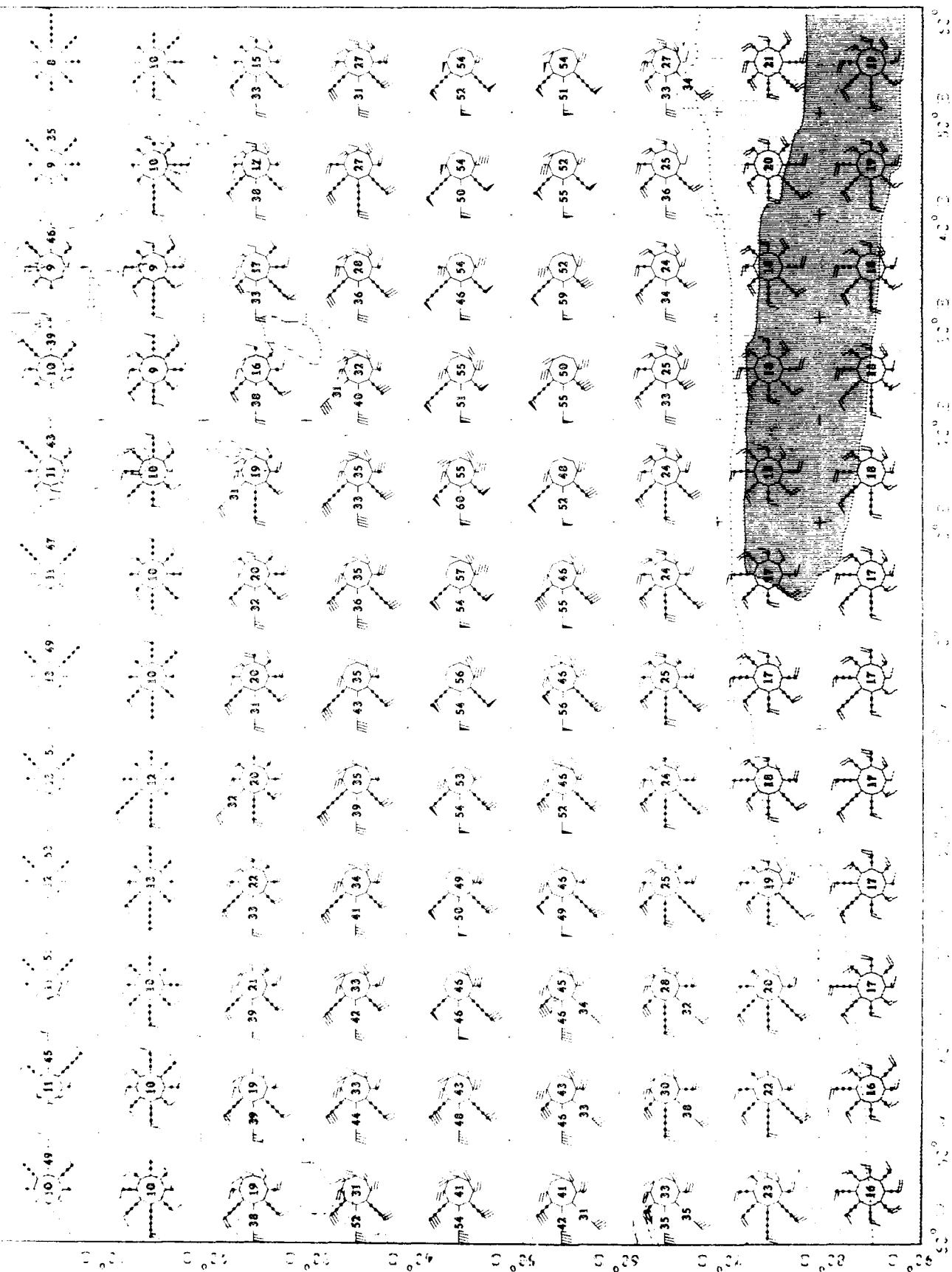


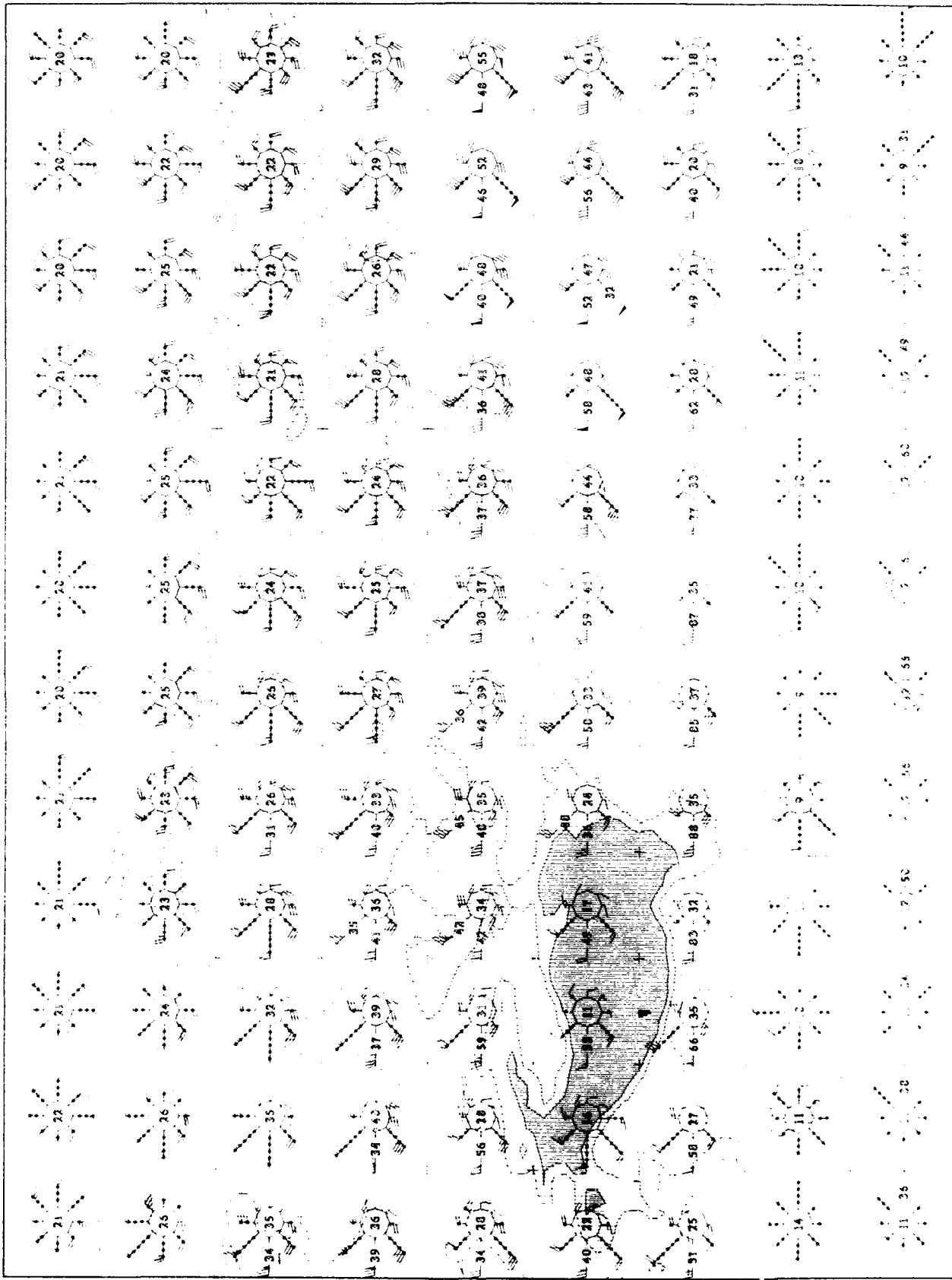


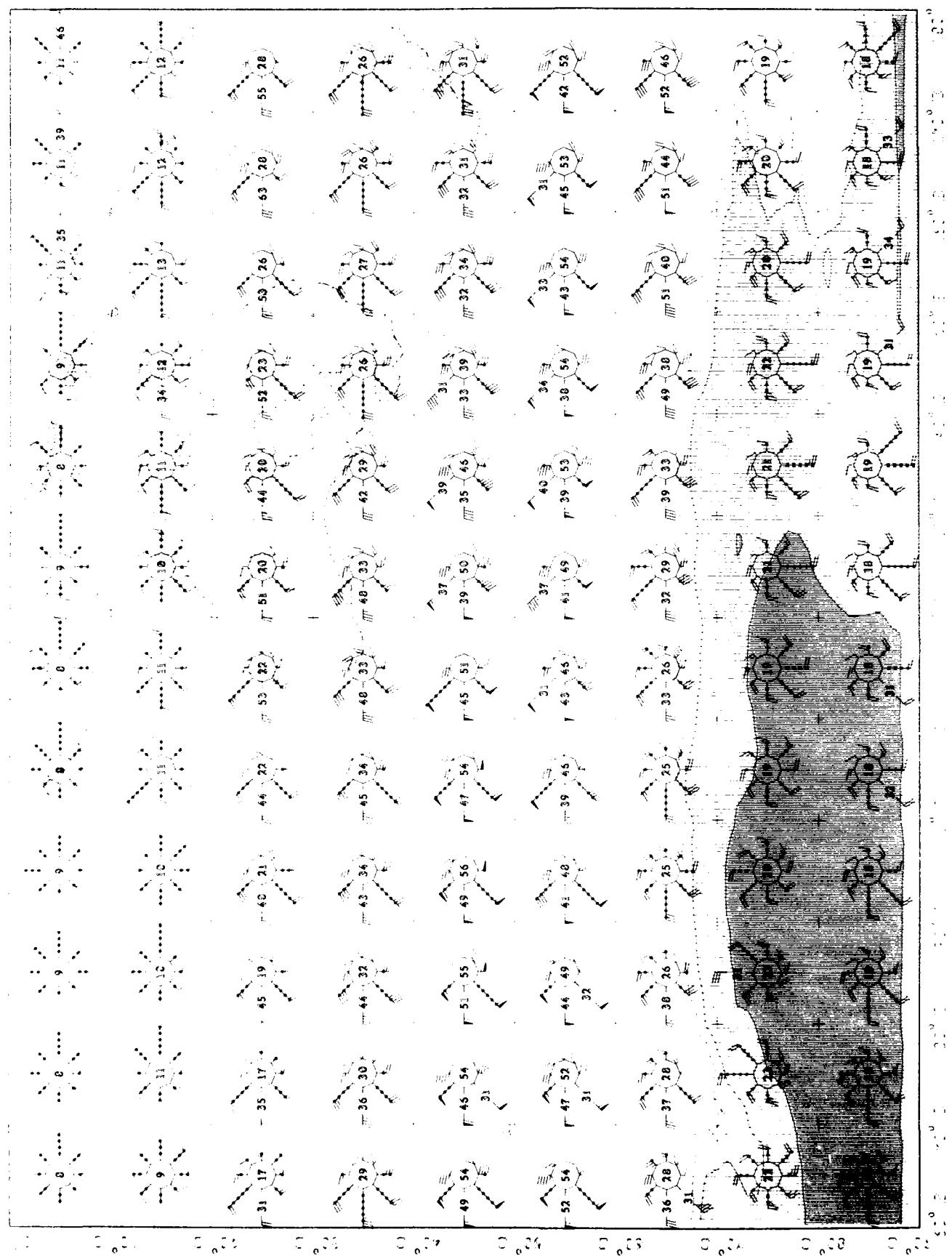












LITERATURE REVIEW

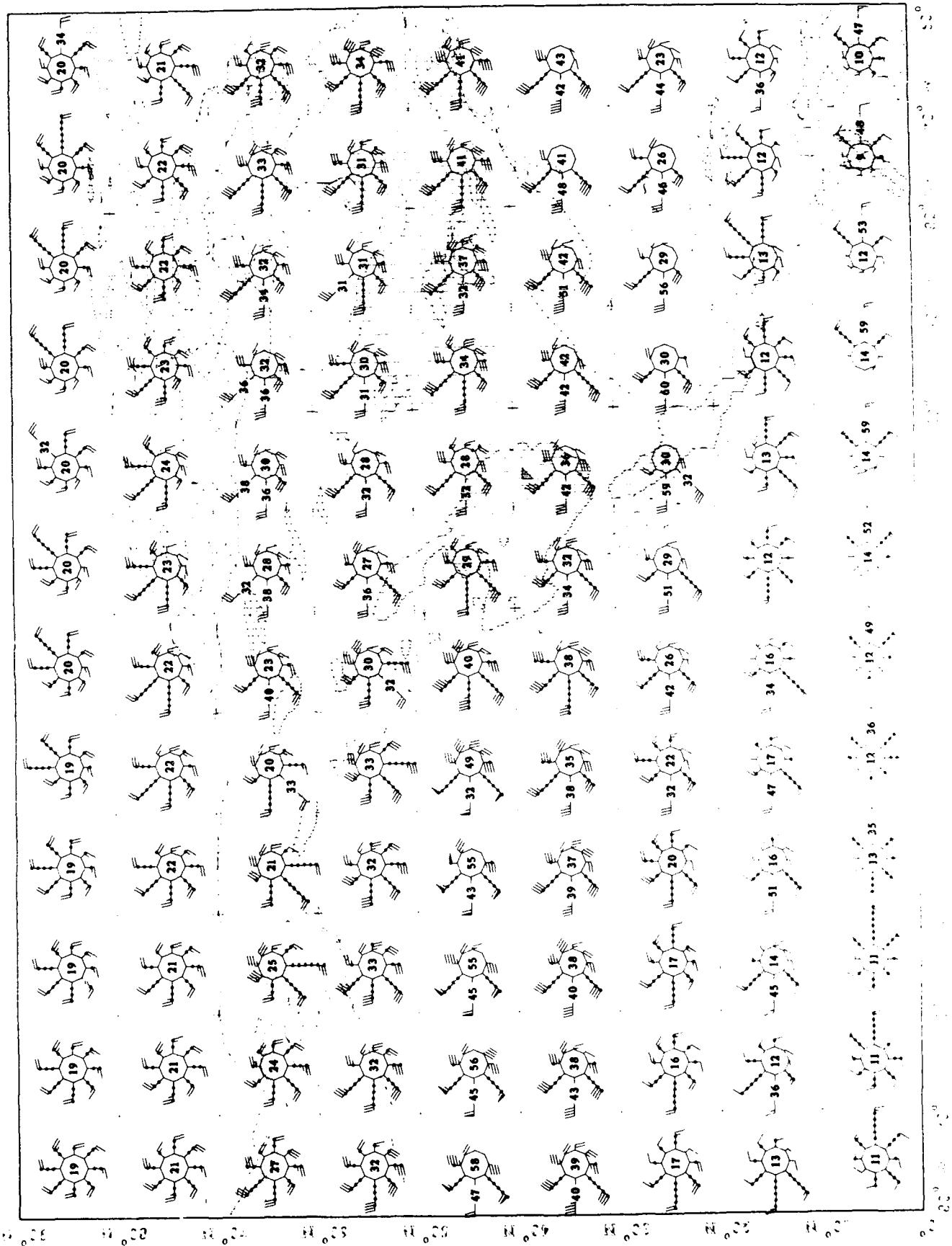
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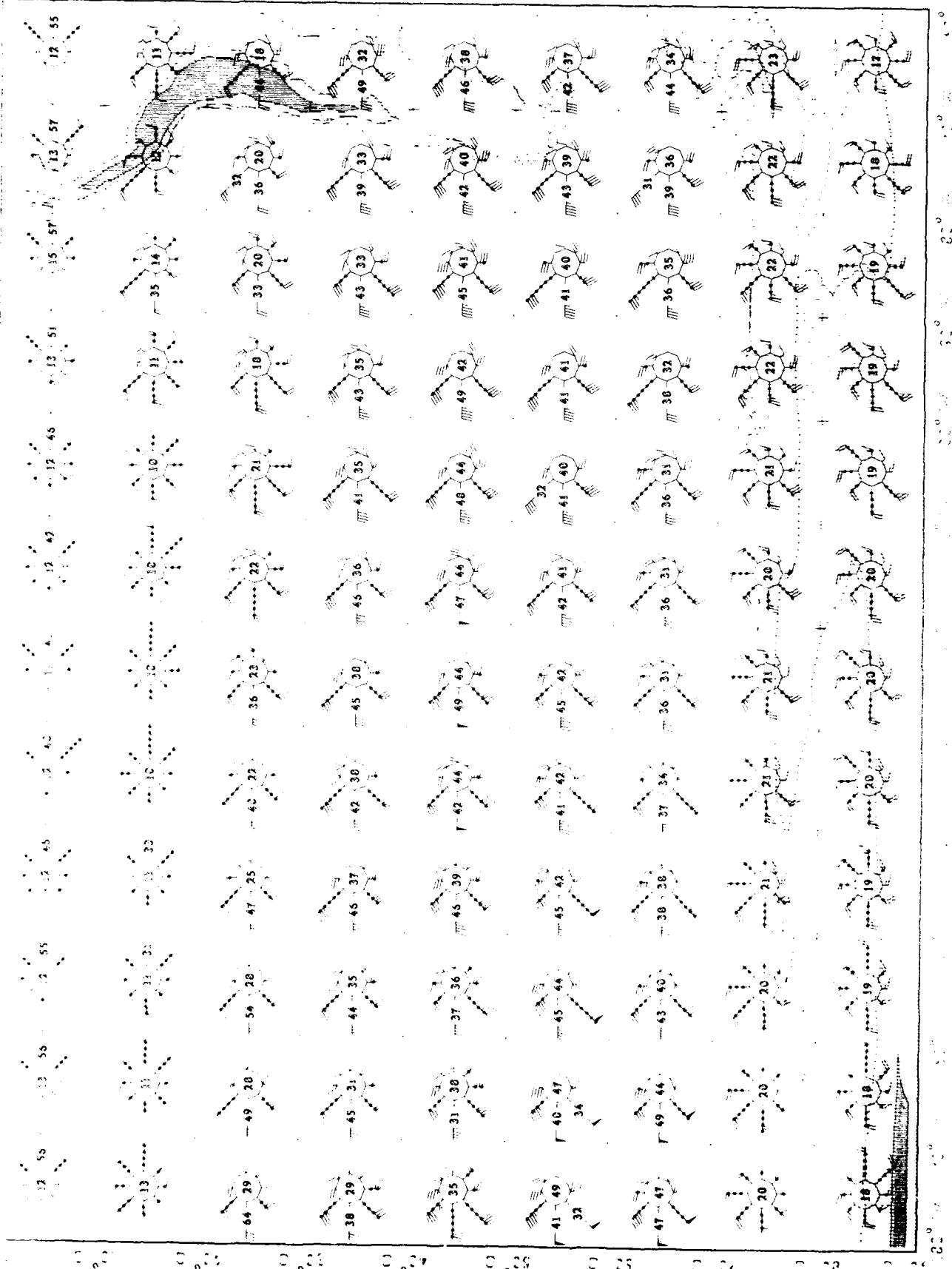
WYOMING
ROSES

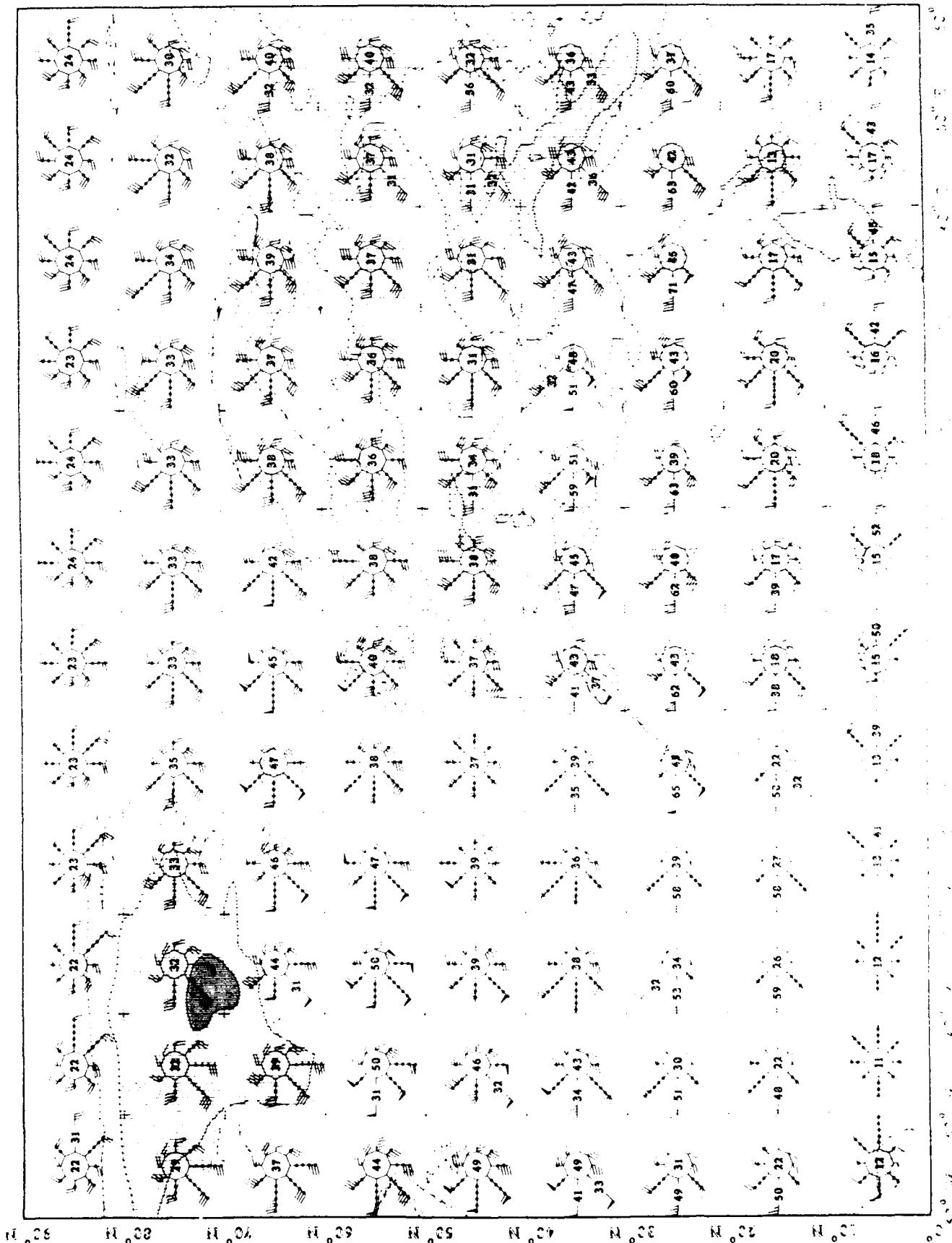
Upper Air Climatology Northern Hemisphere

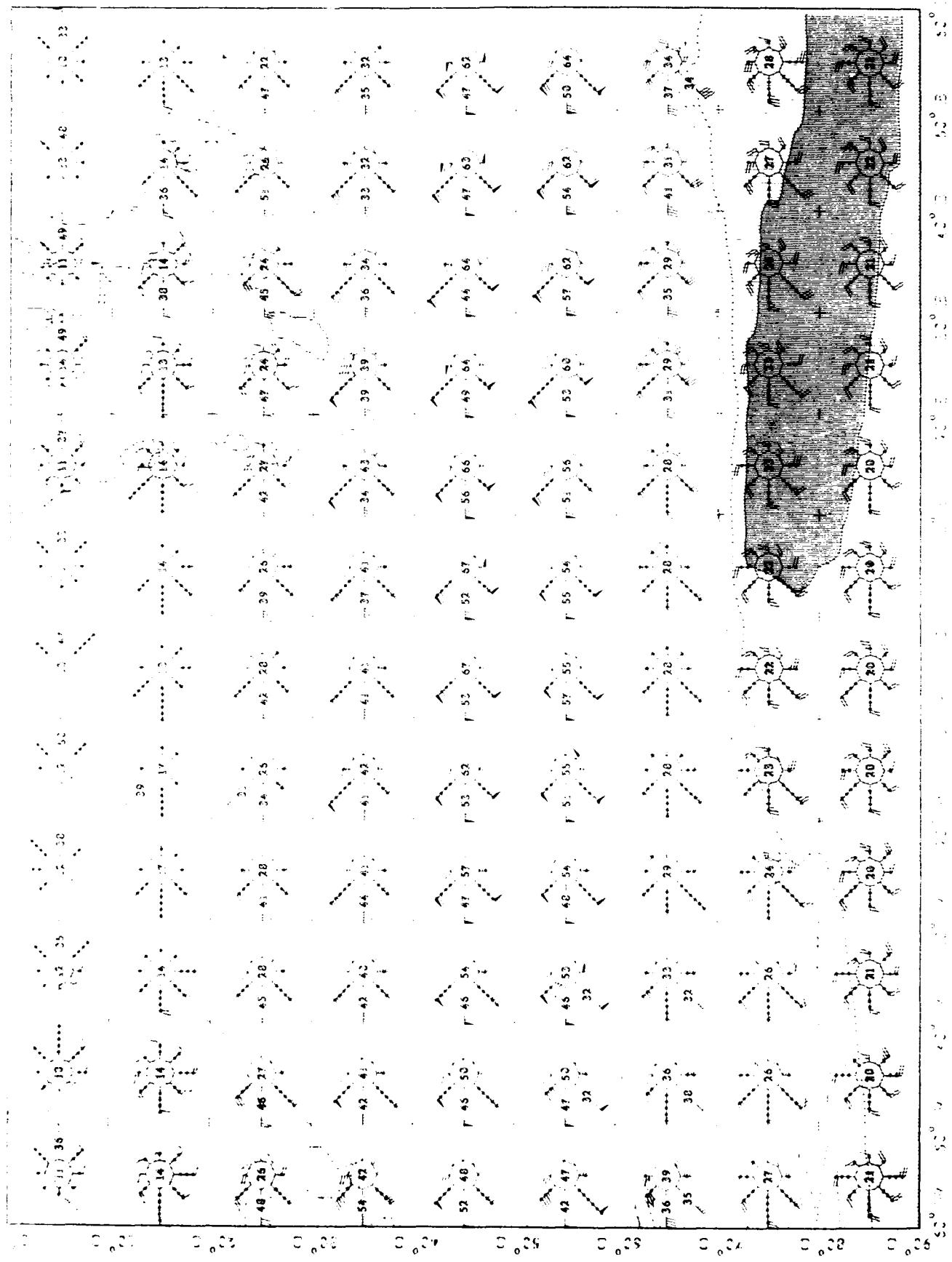


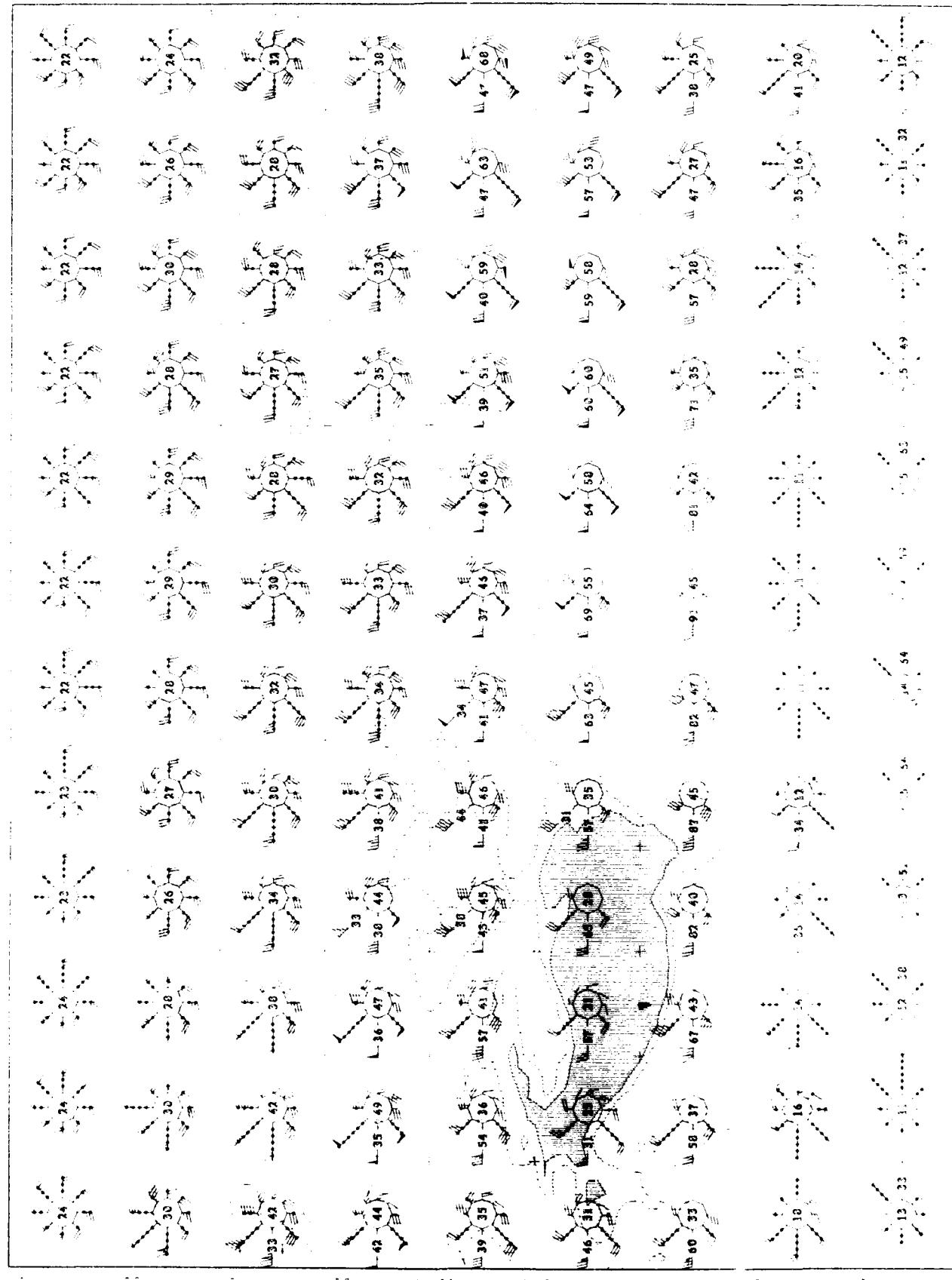
Upper Air Climatology
Southern Hemisphere

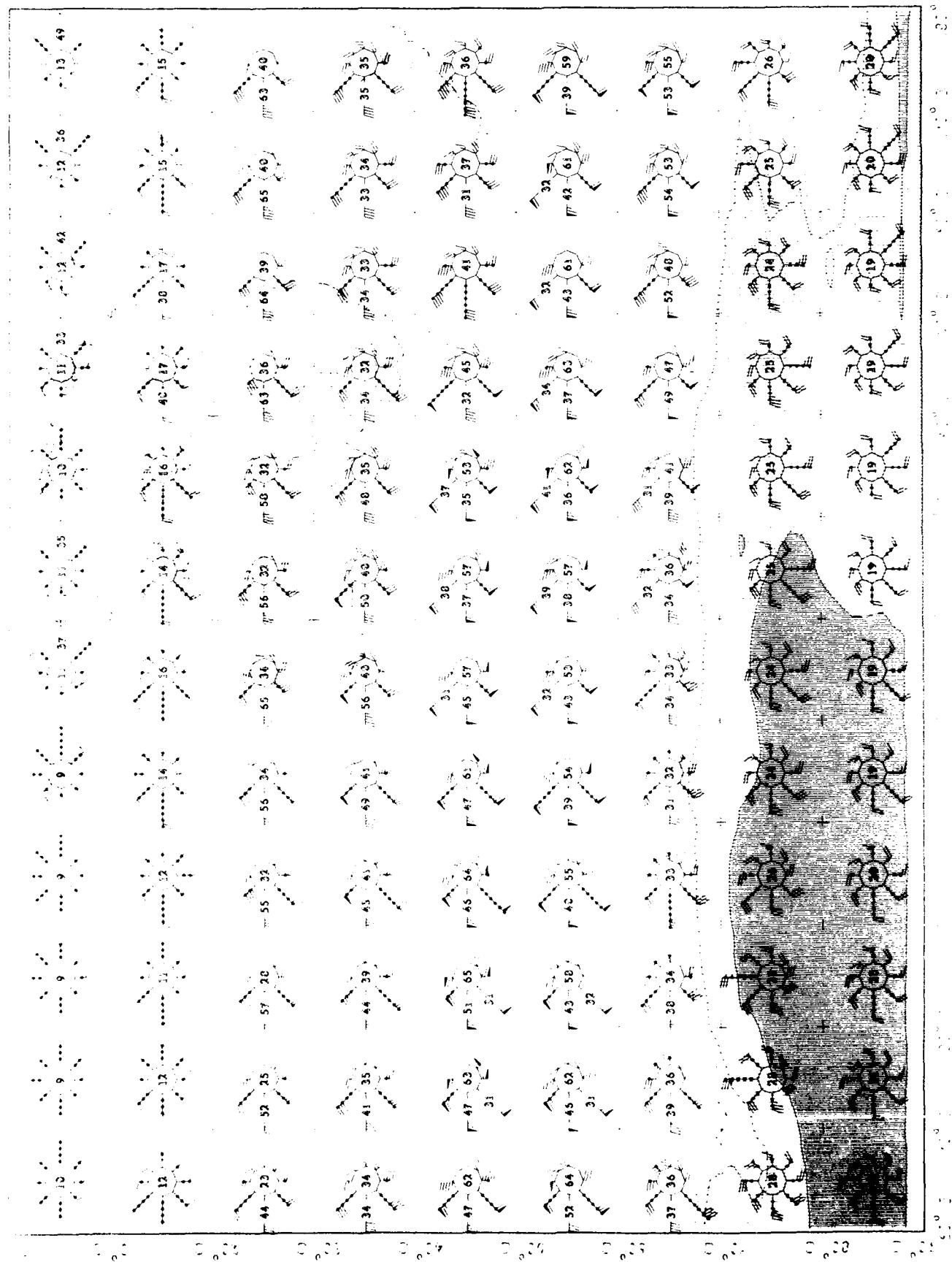
A. J. B. GILL
Geophysical Institute
University of Cambridge

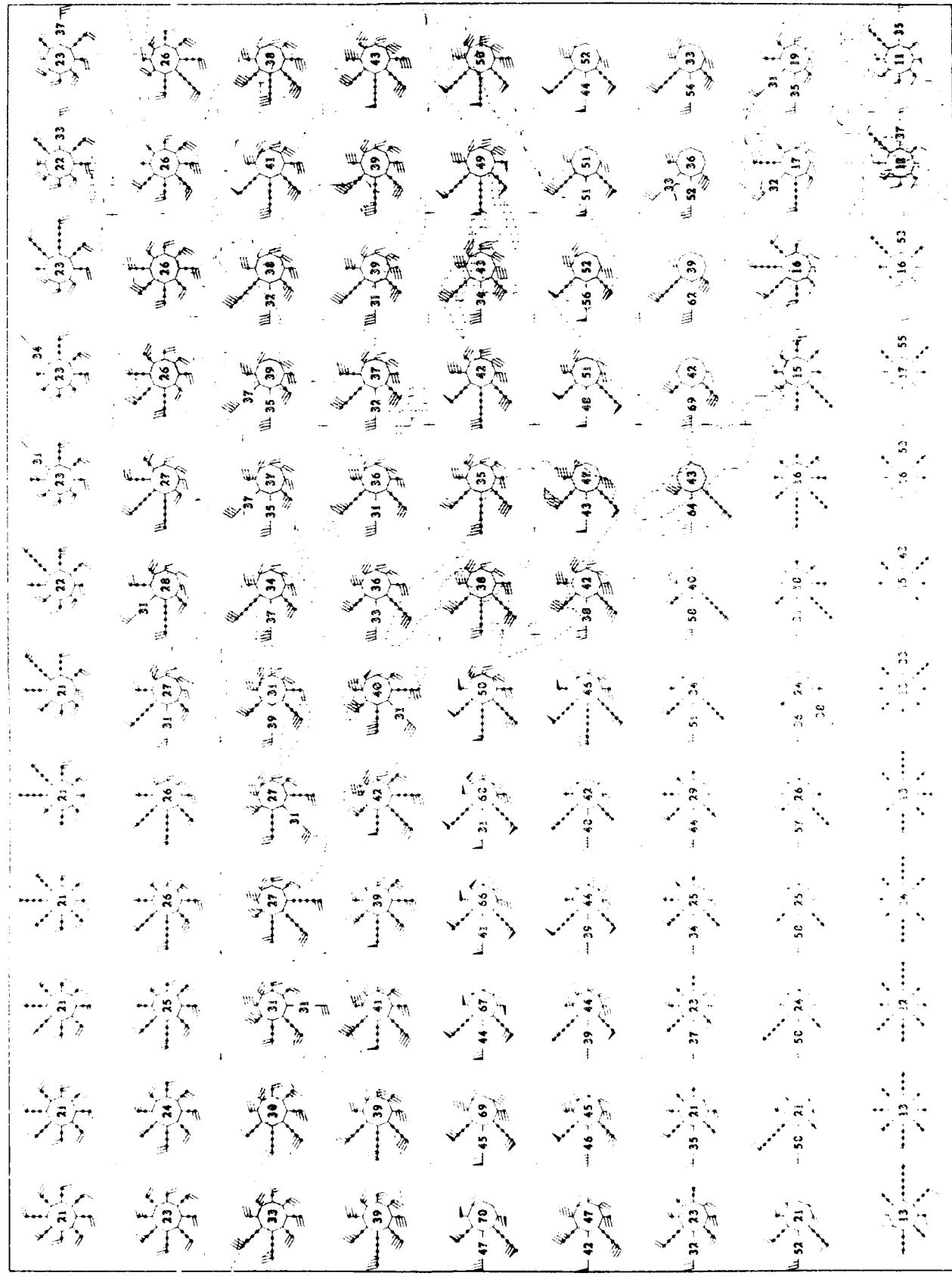


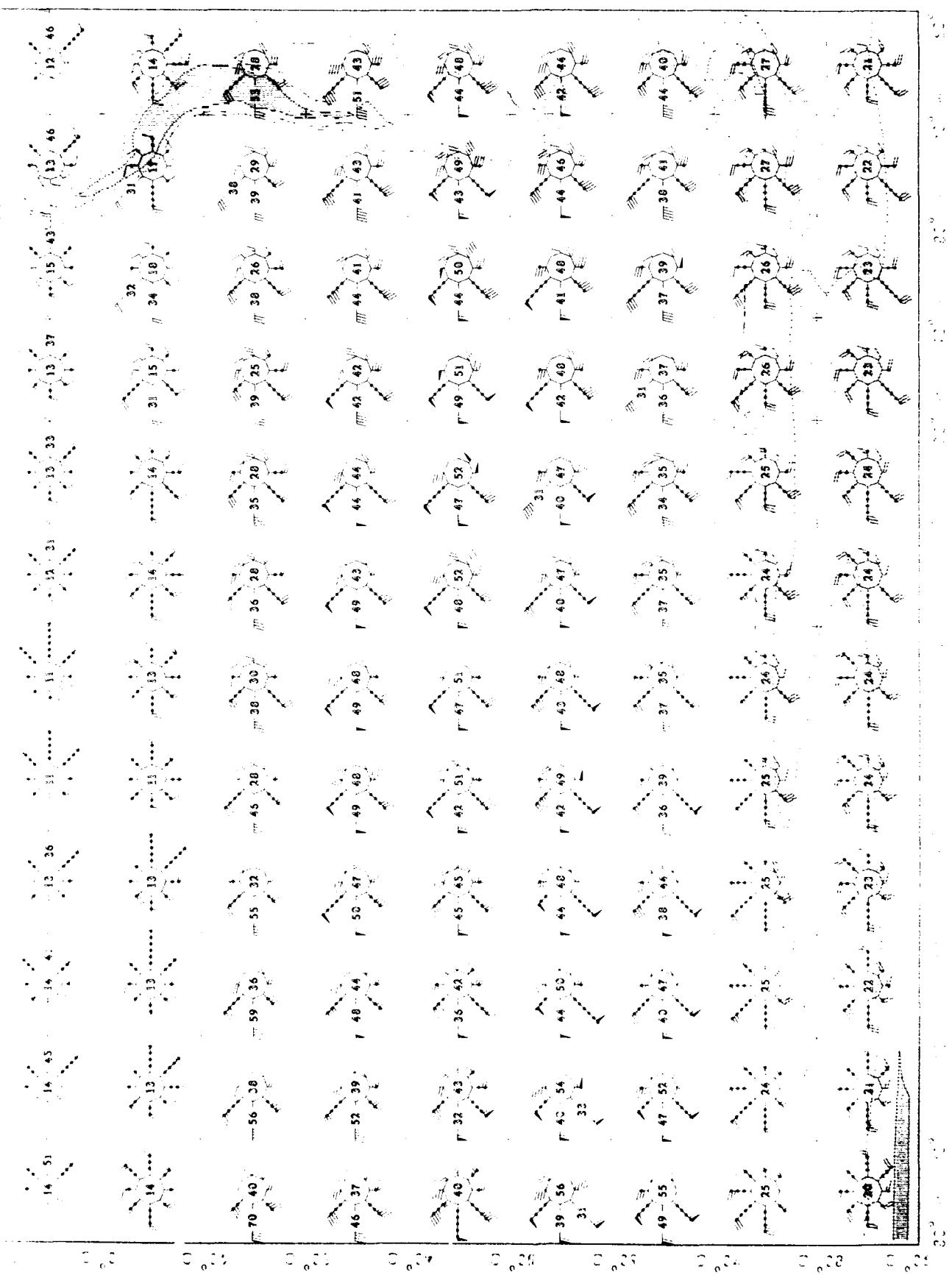


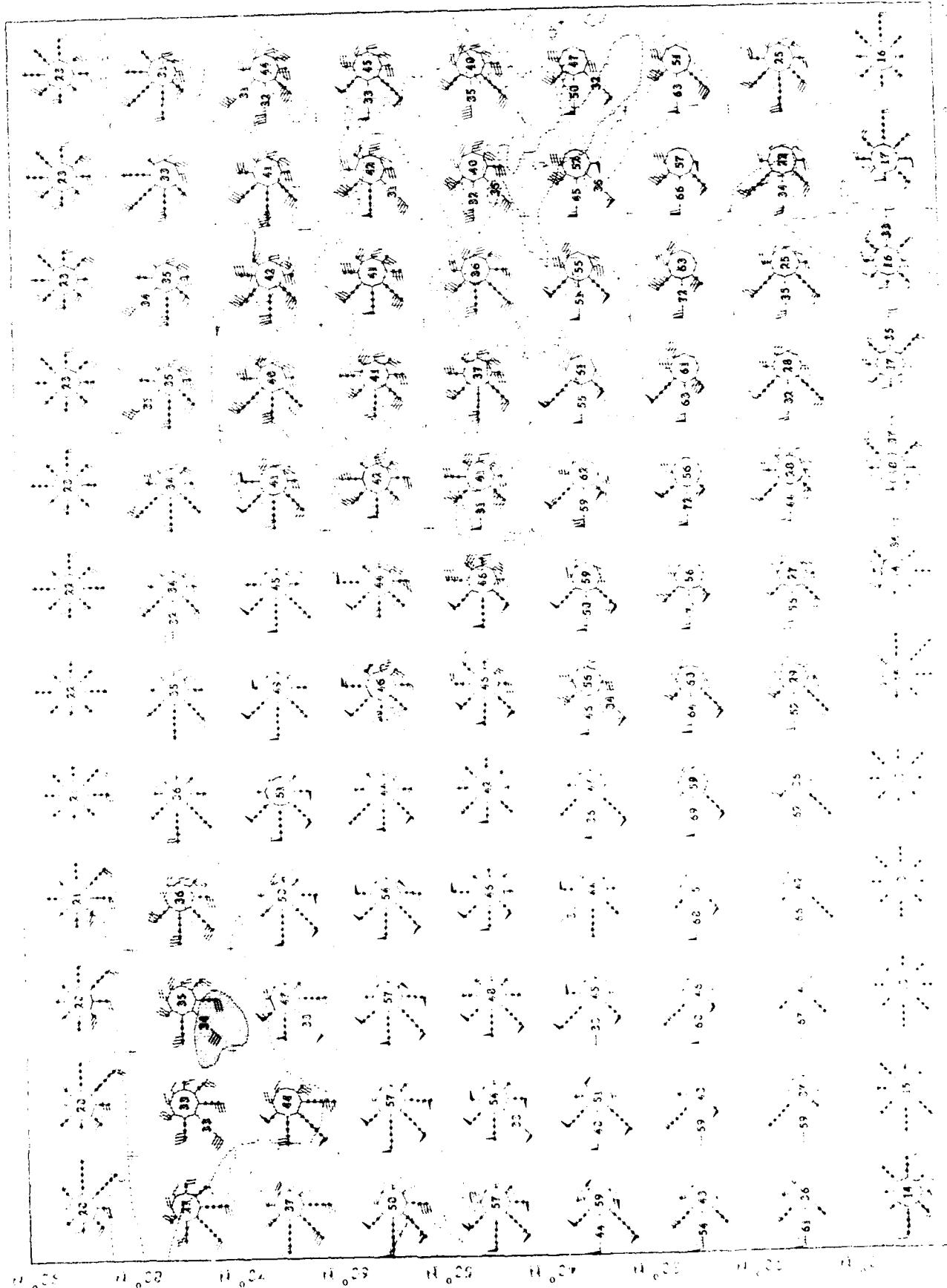


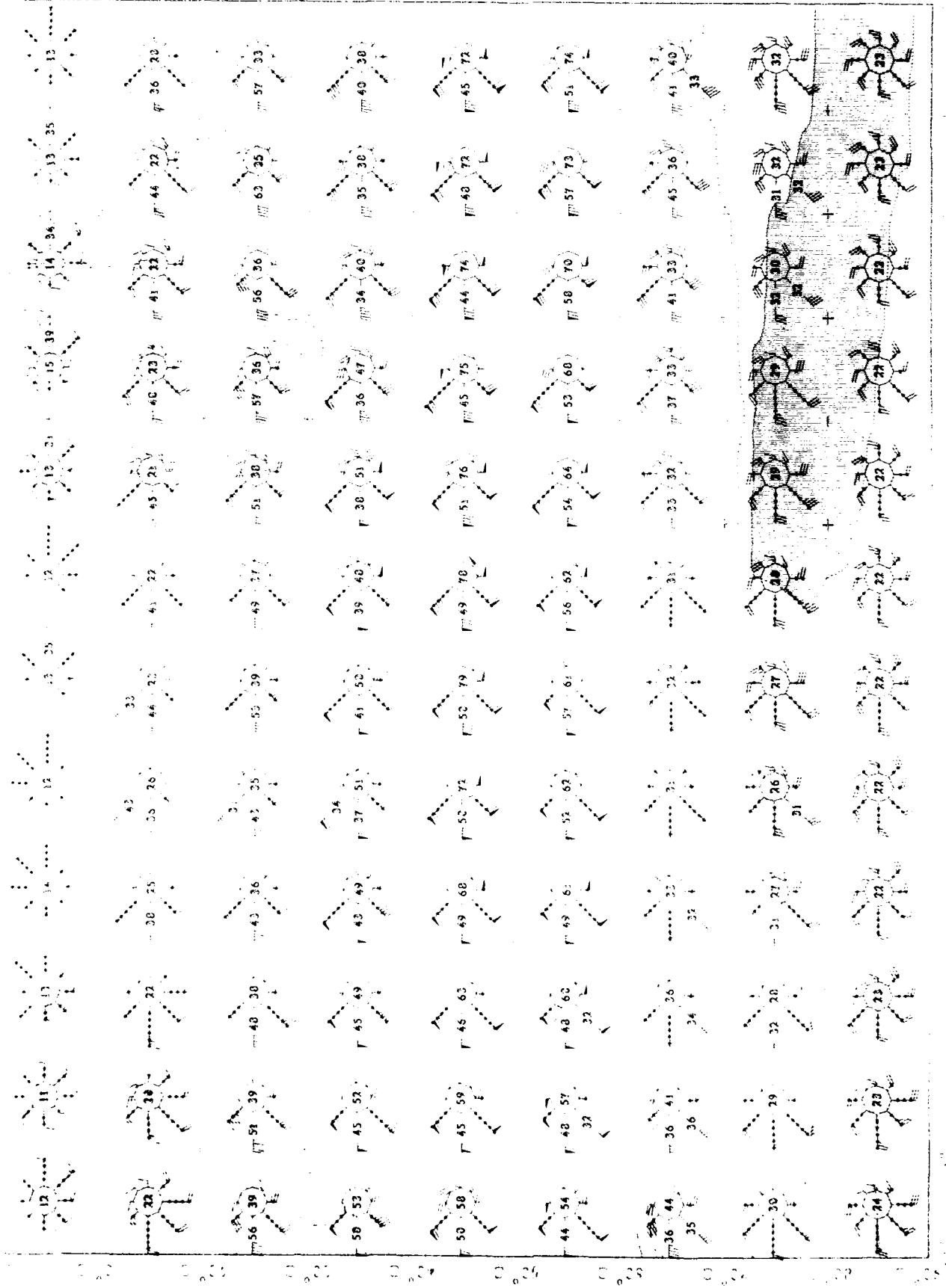


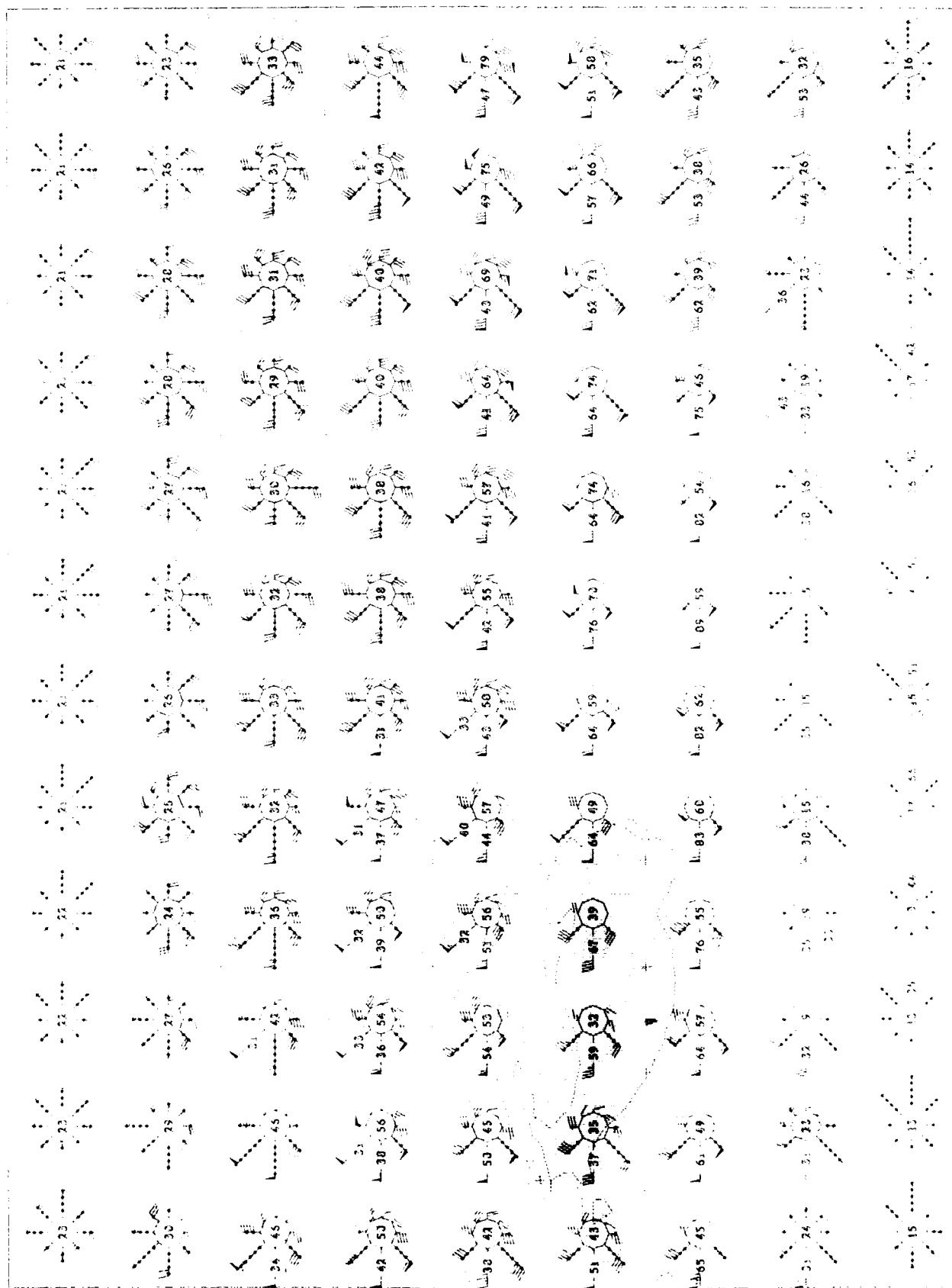












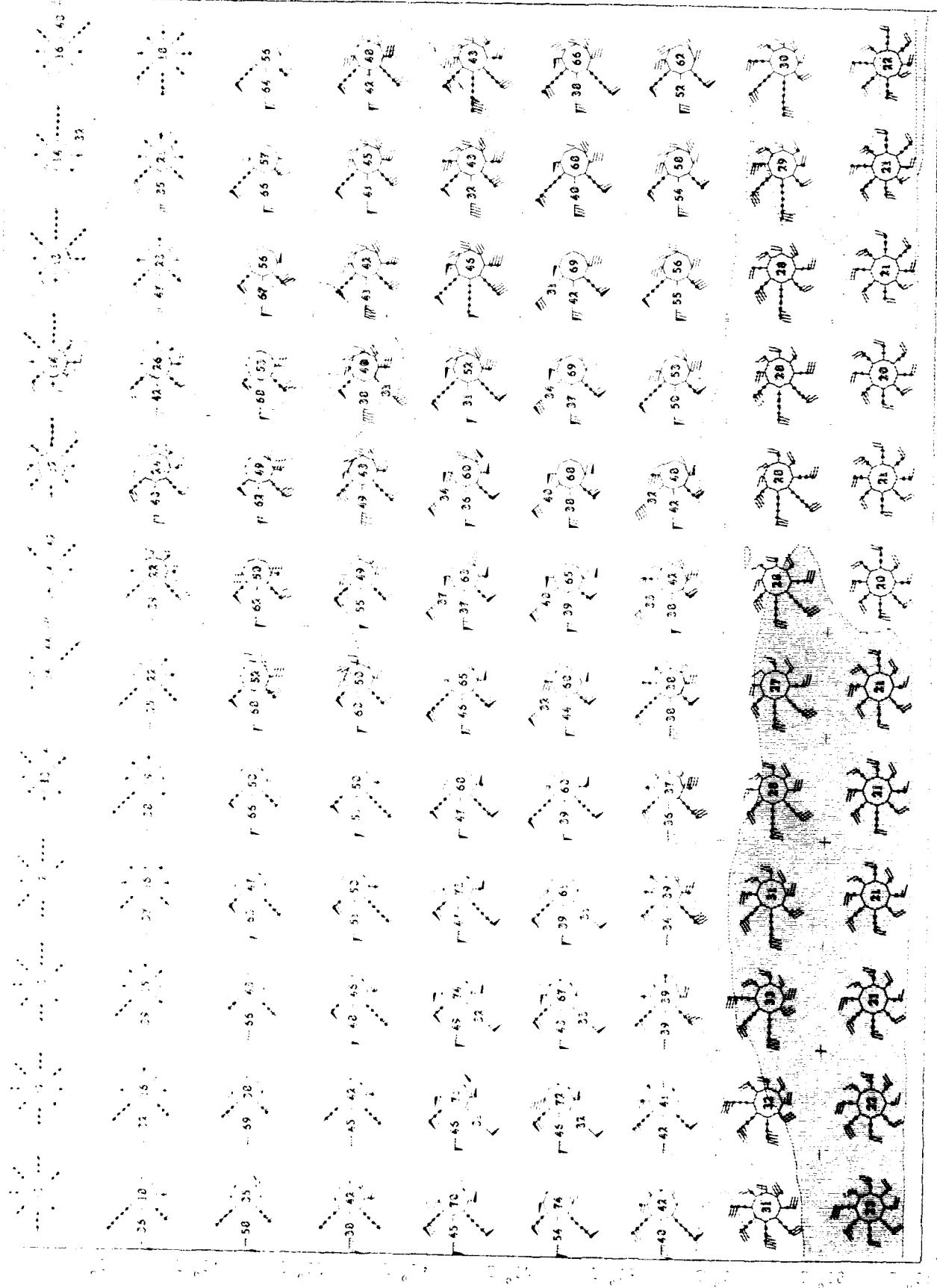
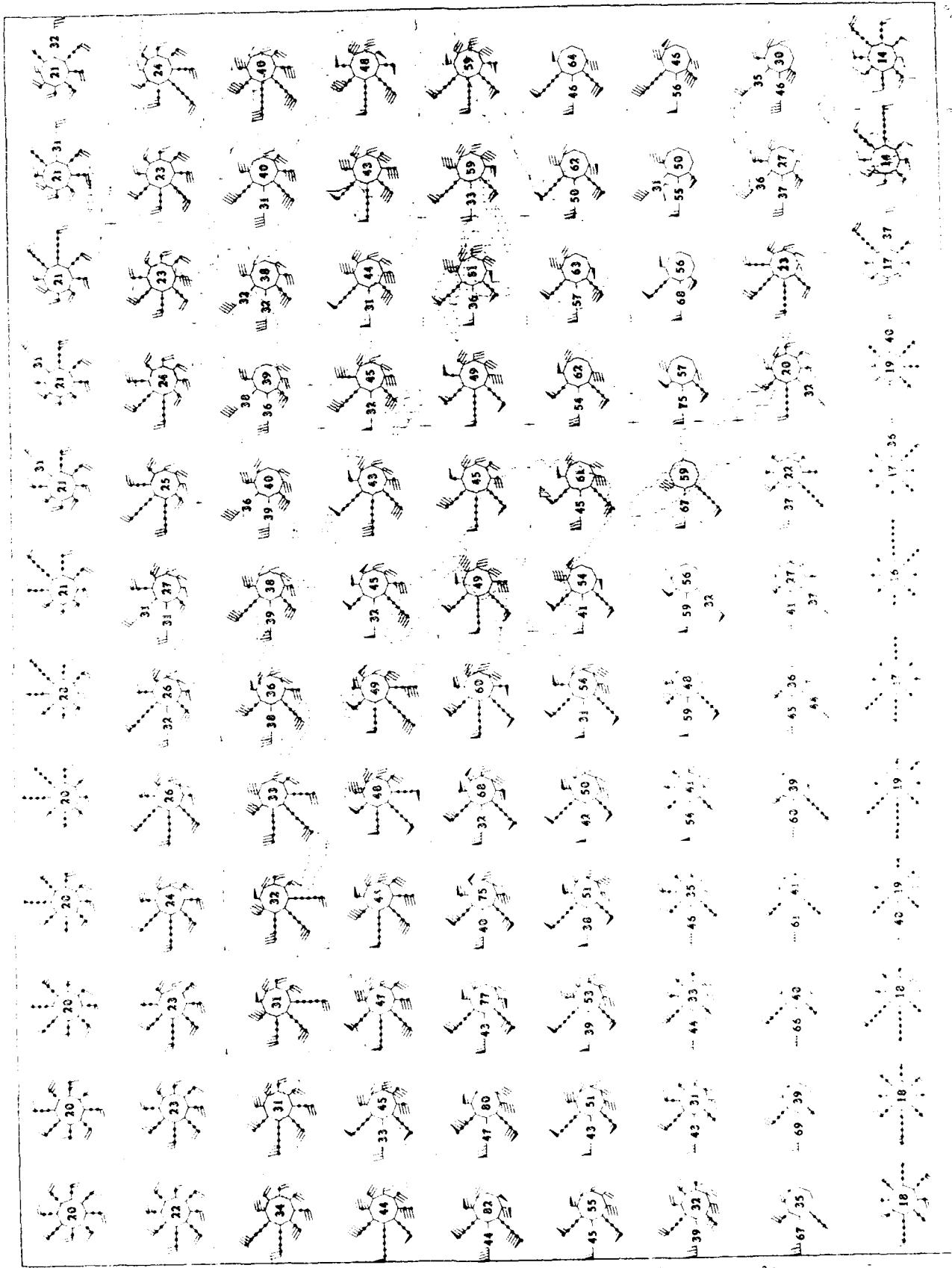


FIGURE 21. *Some Compounds from 1,2,3,
4,5,6,7,8,9,10,11,12,13*



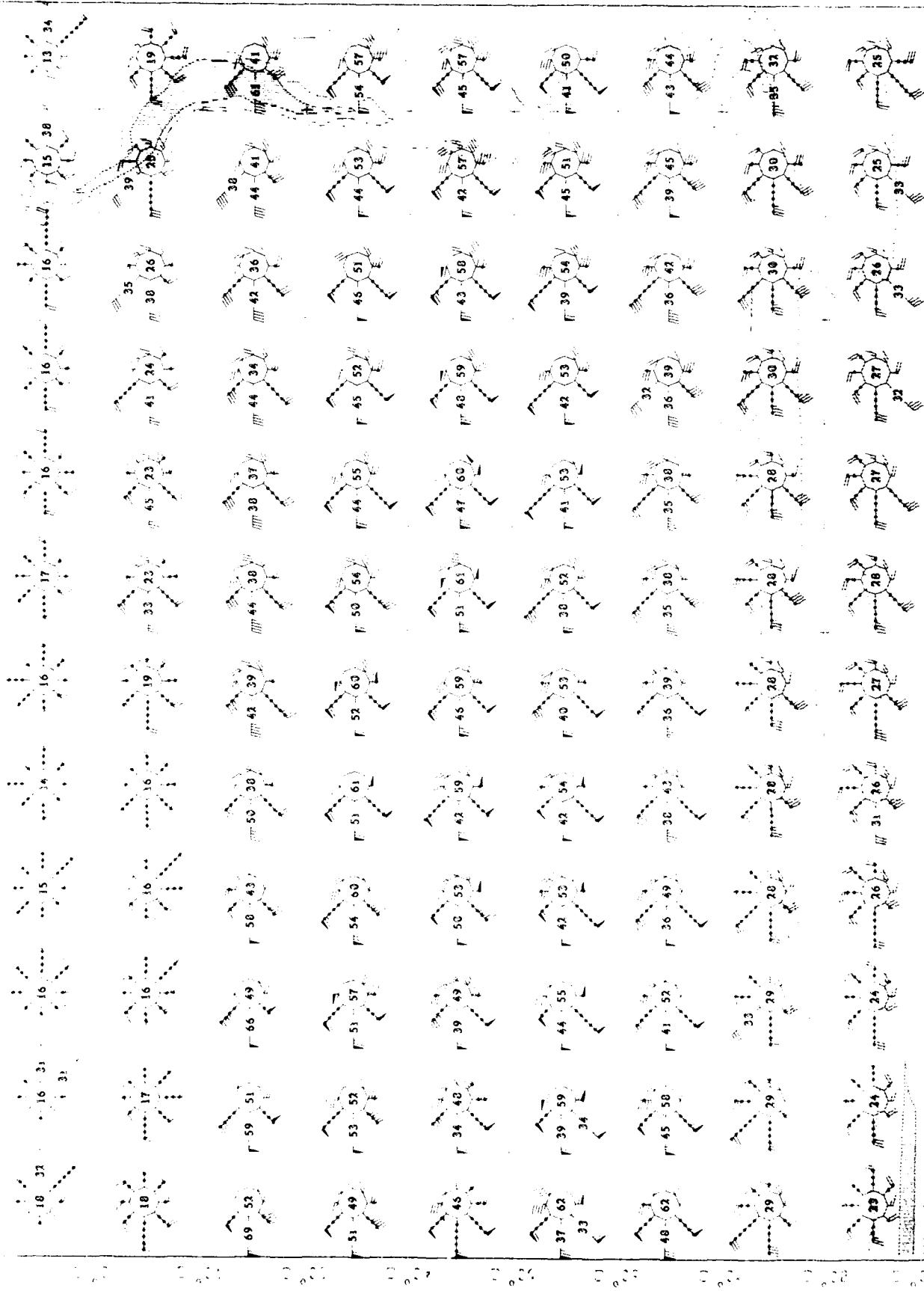
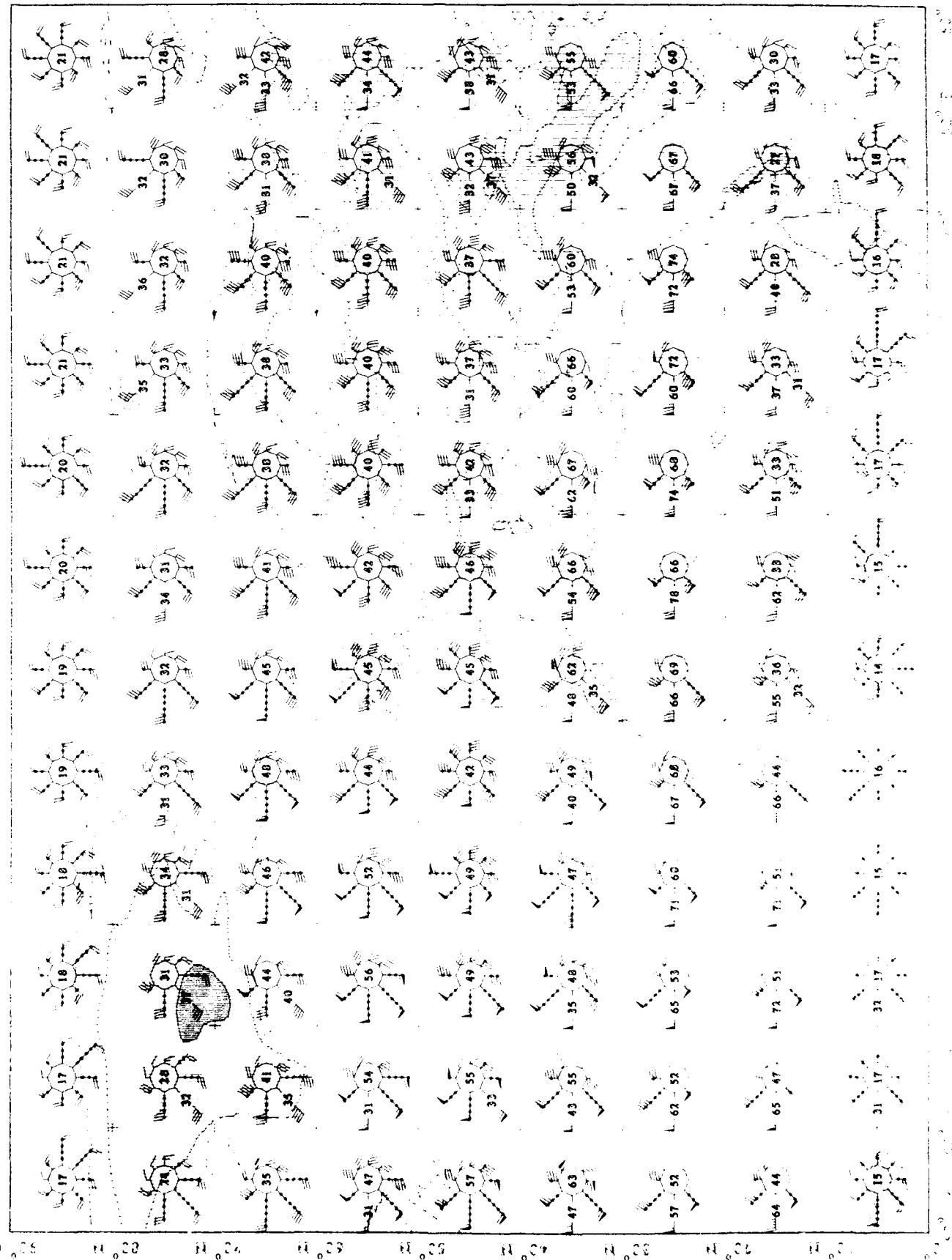


Fig. 2. Amino Acid Sequence
Northern Hemisphere

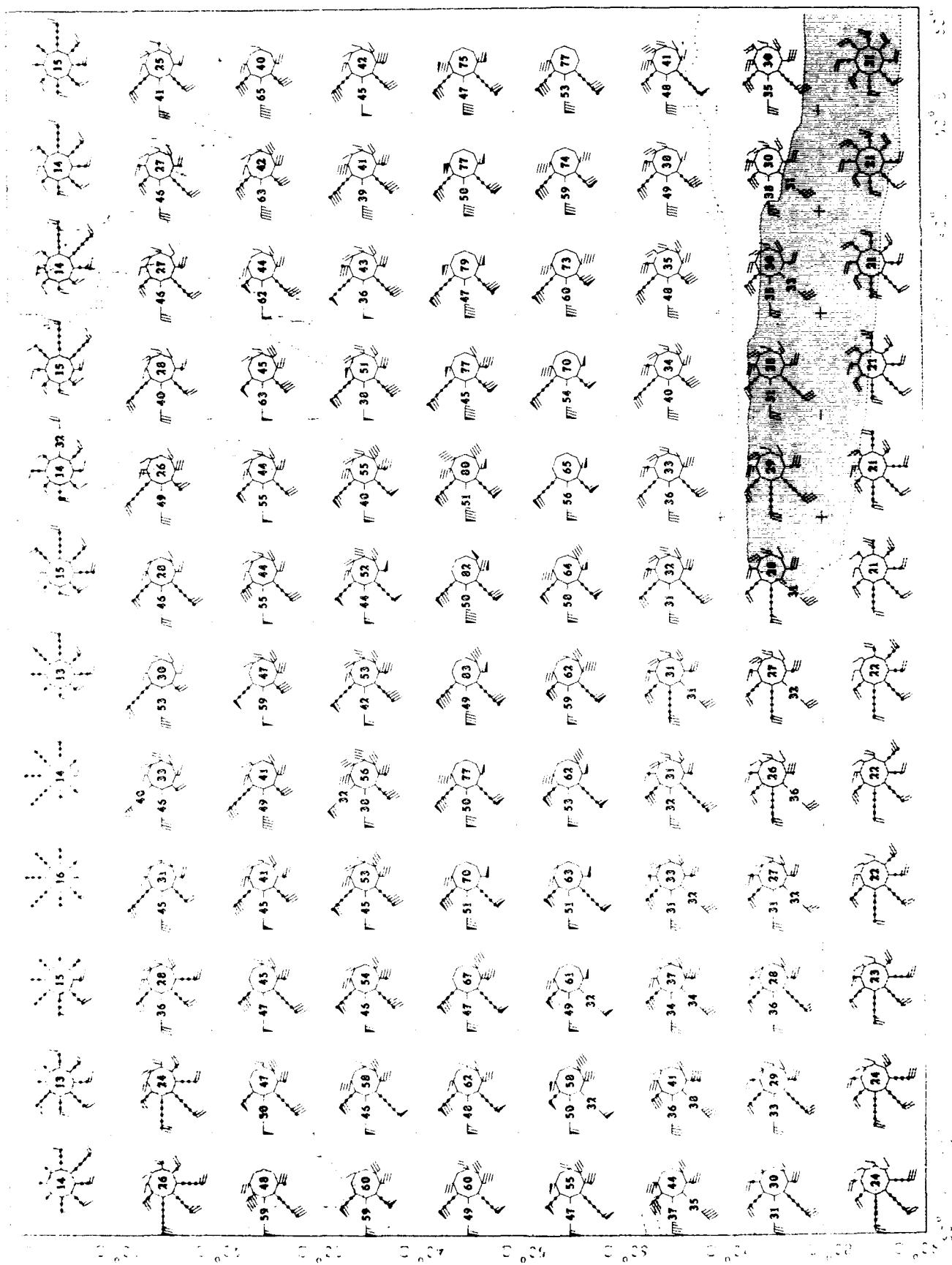
1968-69
1969-70

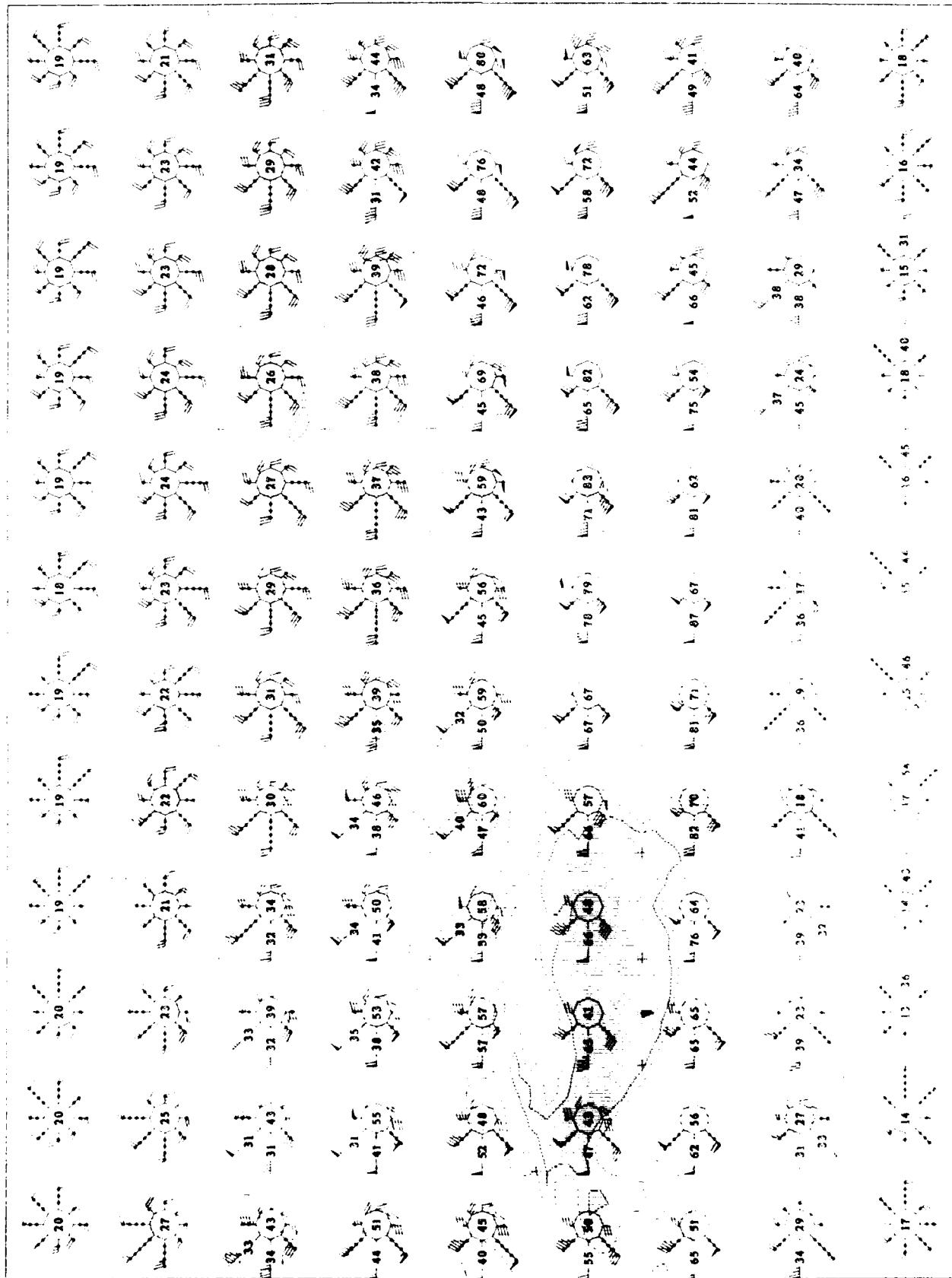


Upper Air Climatology
Southern Hemisphere

1950-1955
1950-1955
1950-1955

April
250 mb





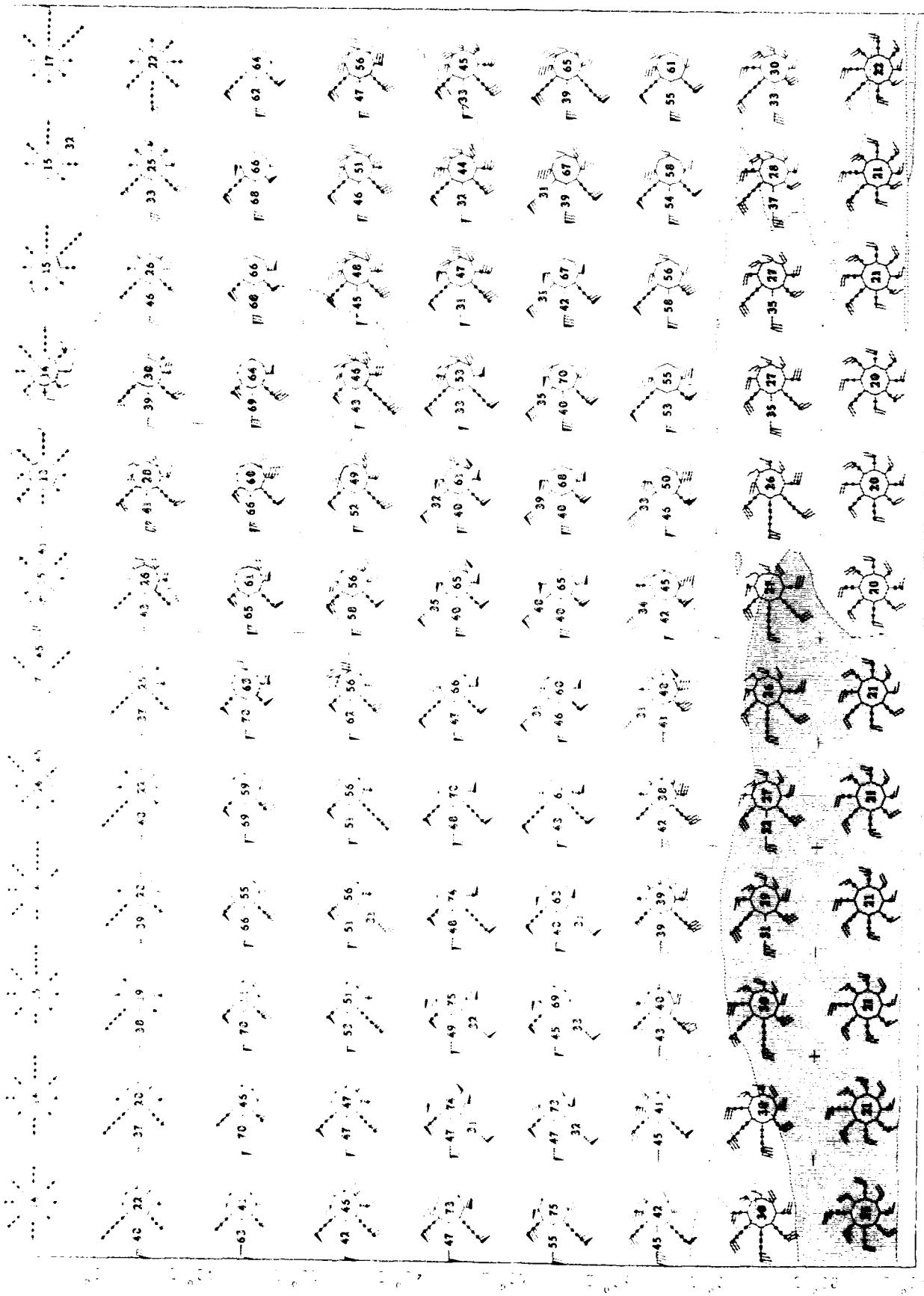
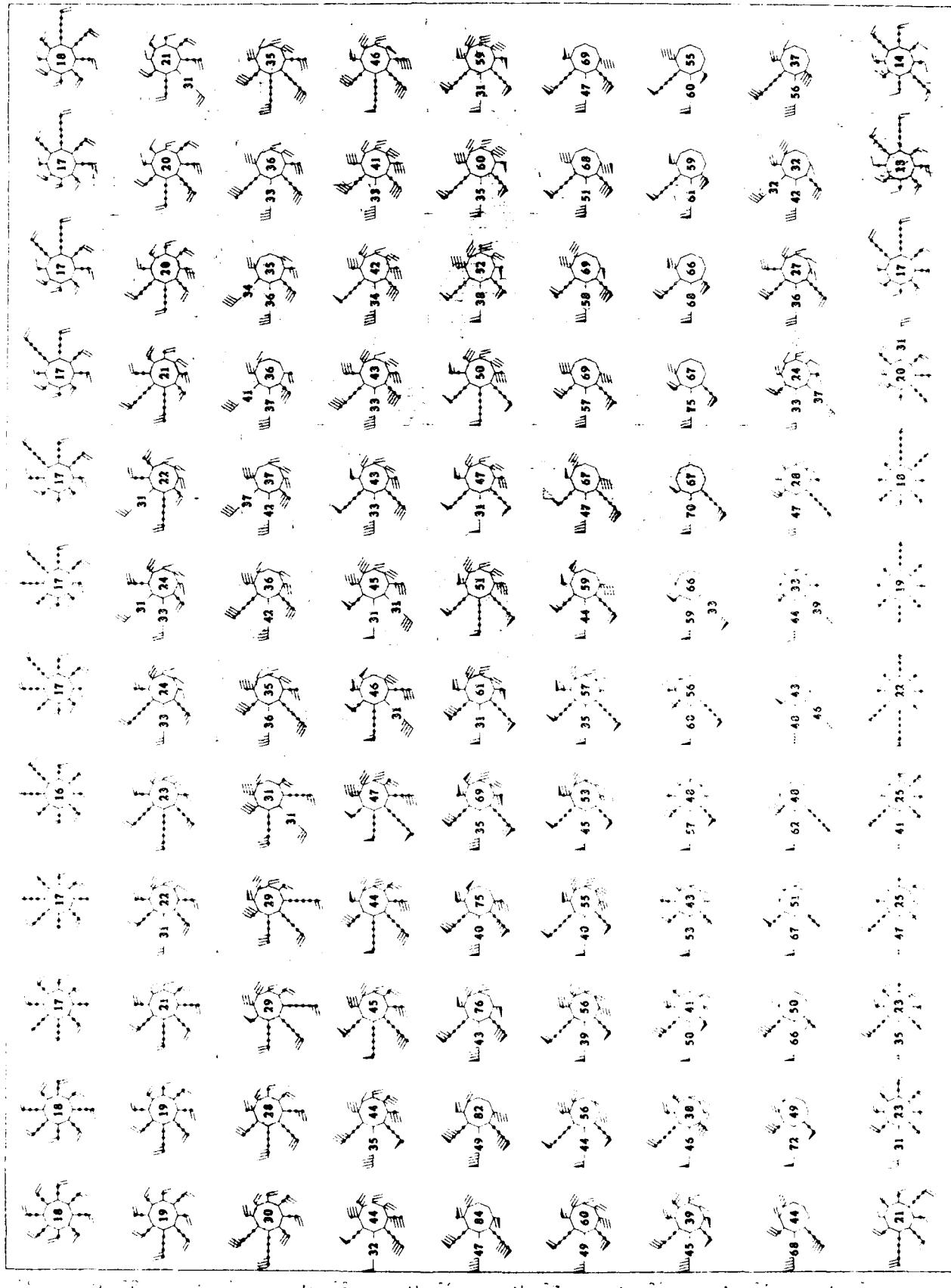


Fig. 2. *Geographical distribution of Northern Hemisphere*

Geographical distribution of Northern Hemisphere

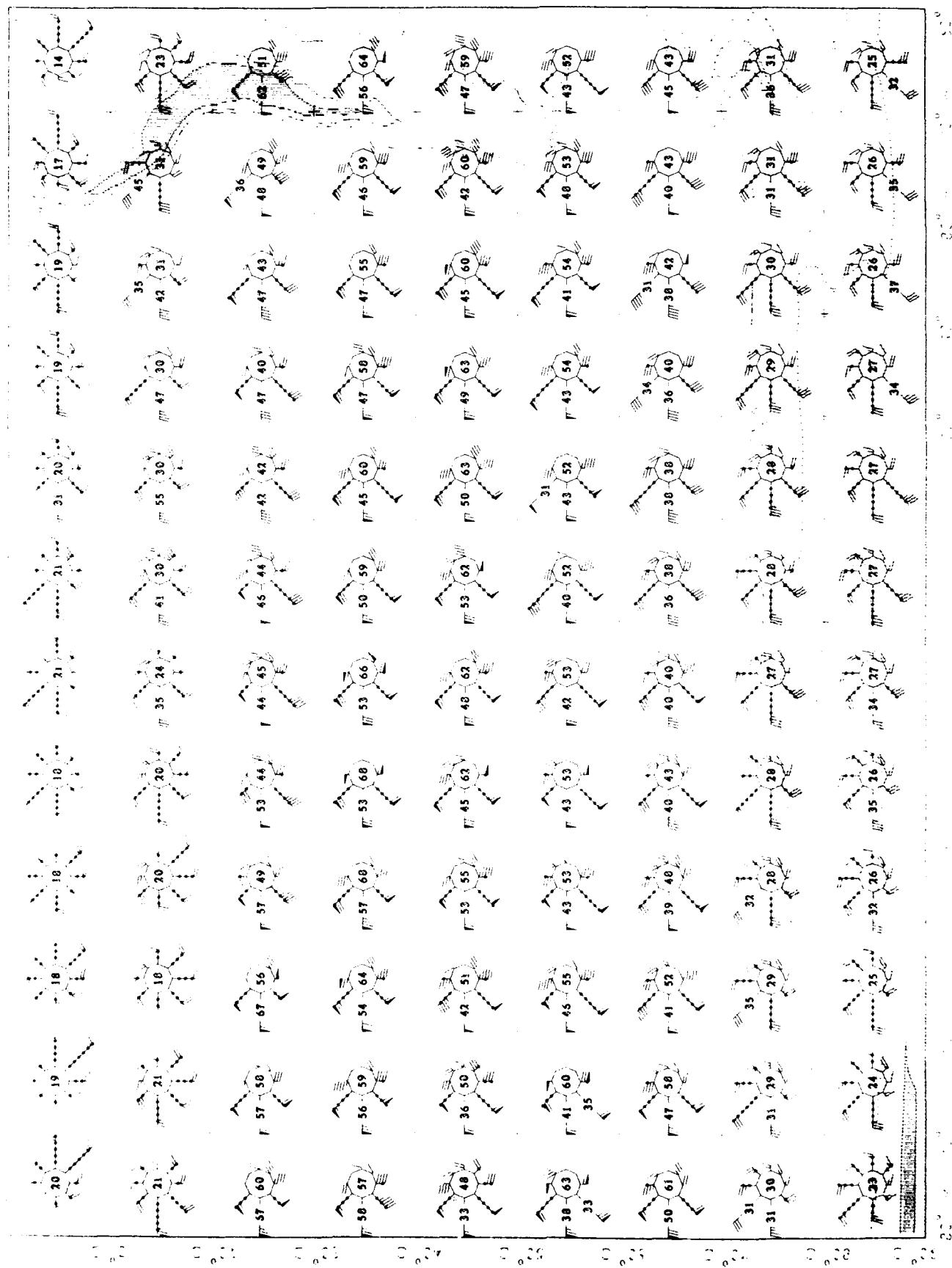
Geographical distribution of Northern Hemisphere

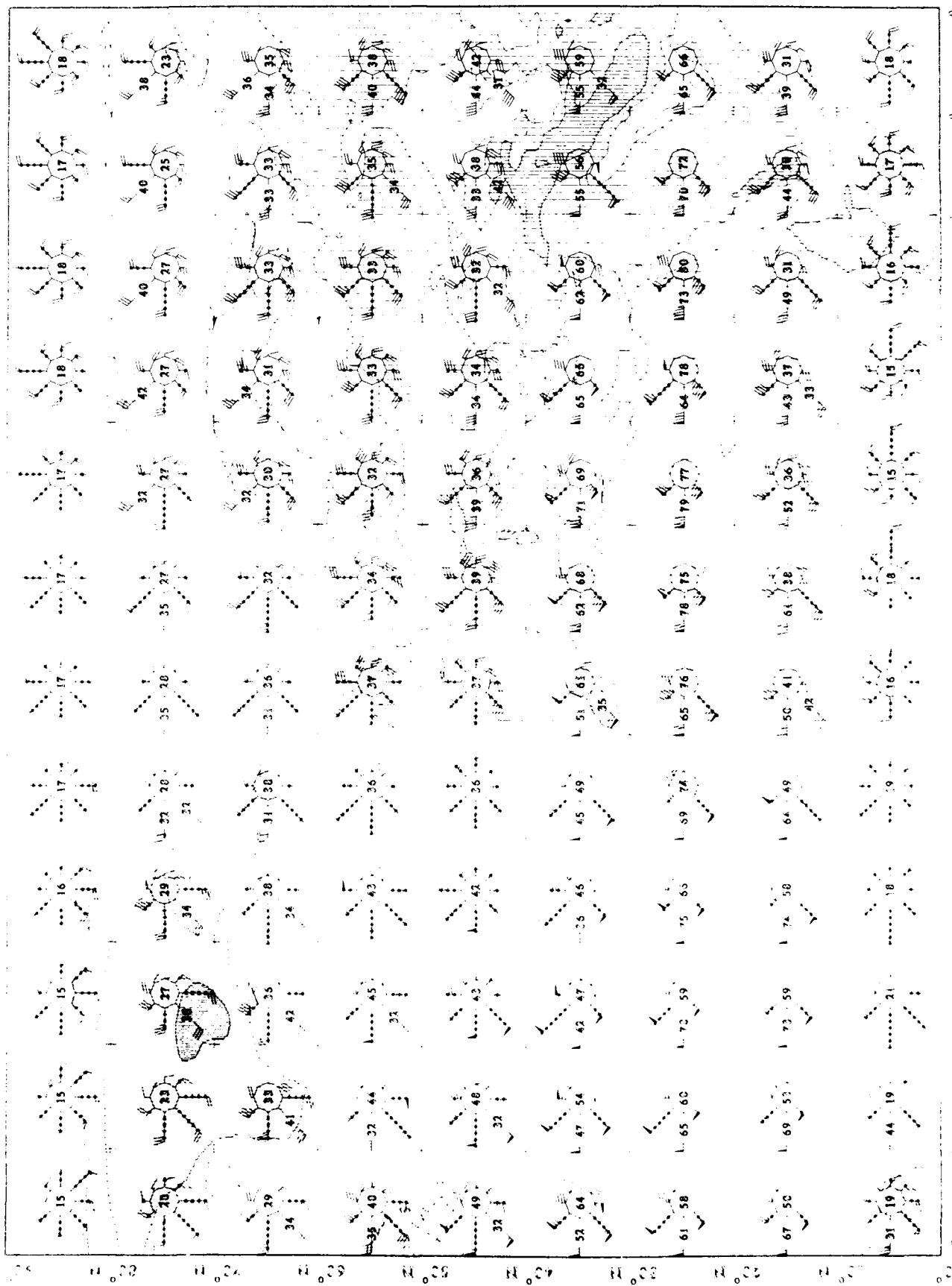


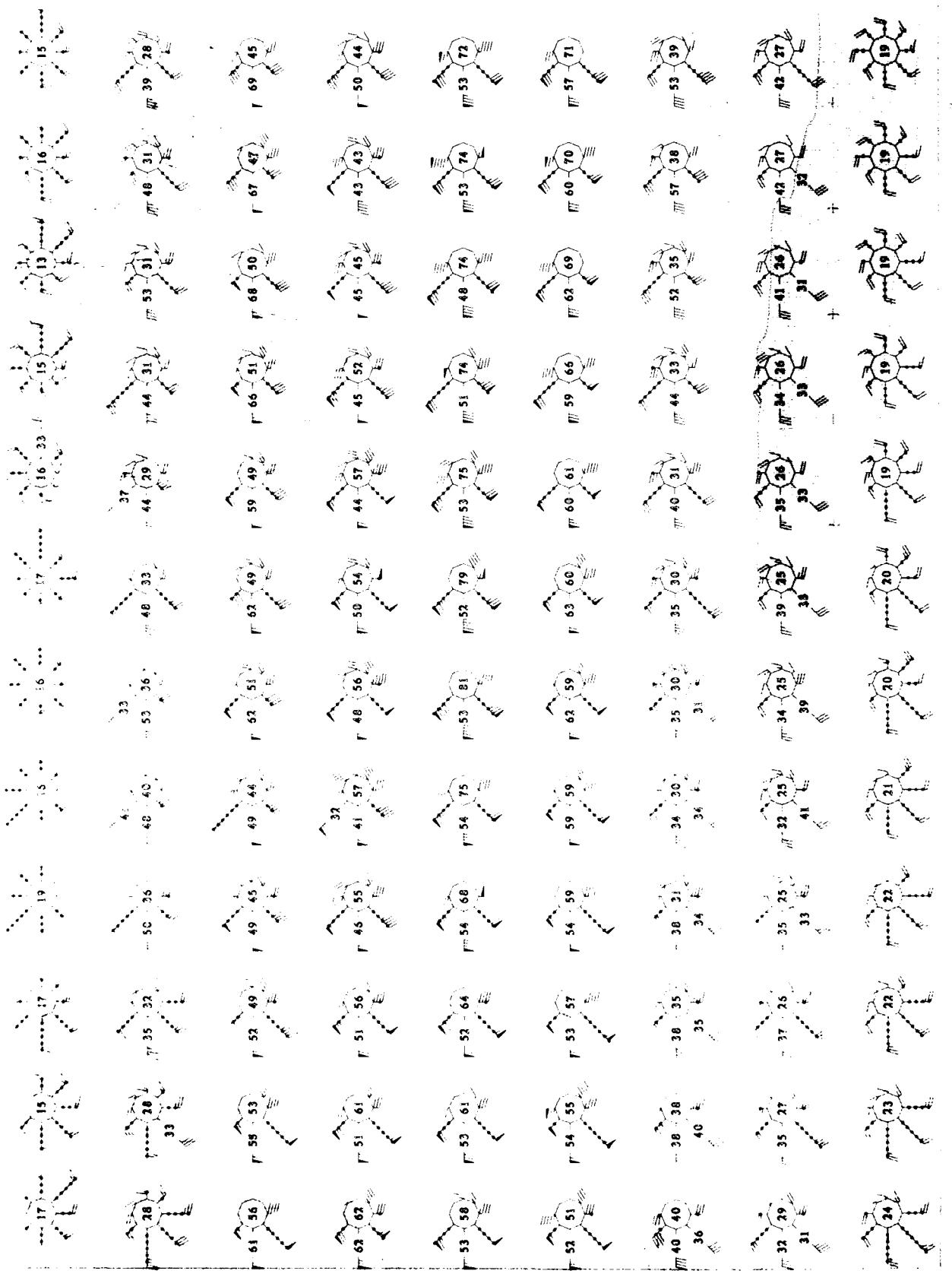
Upper Air Climatology
Southern Hemisphere

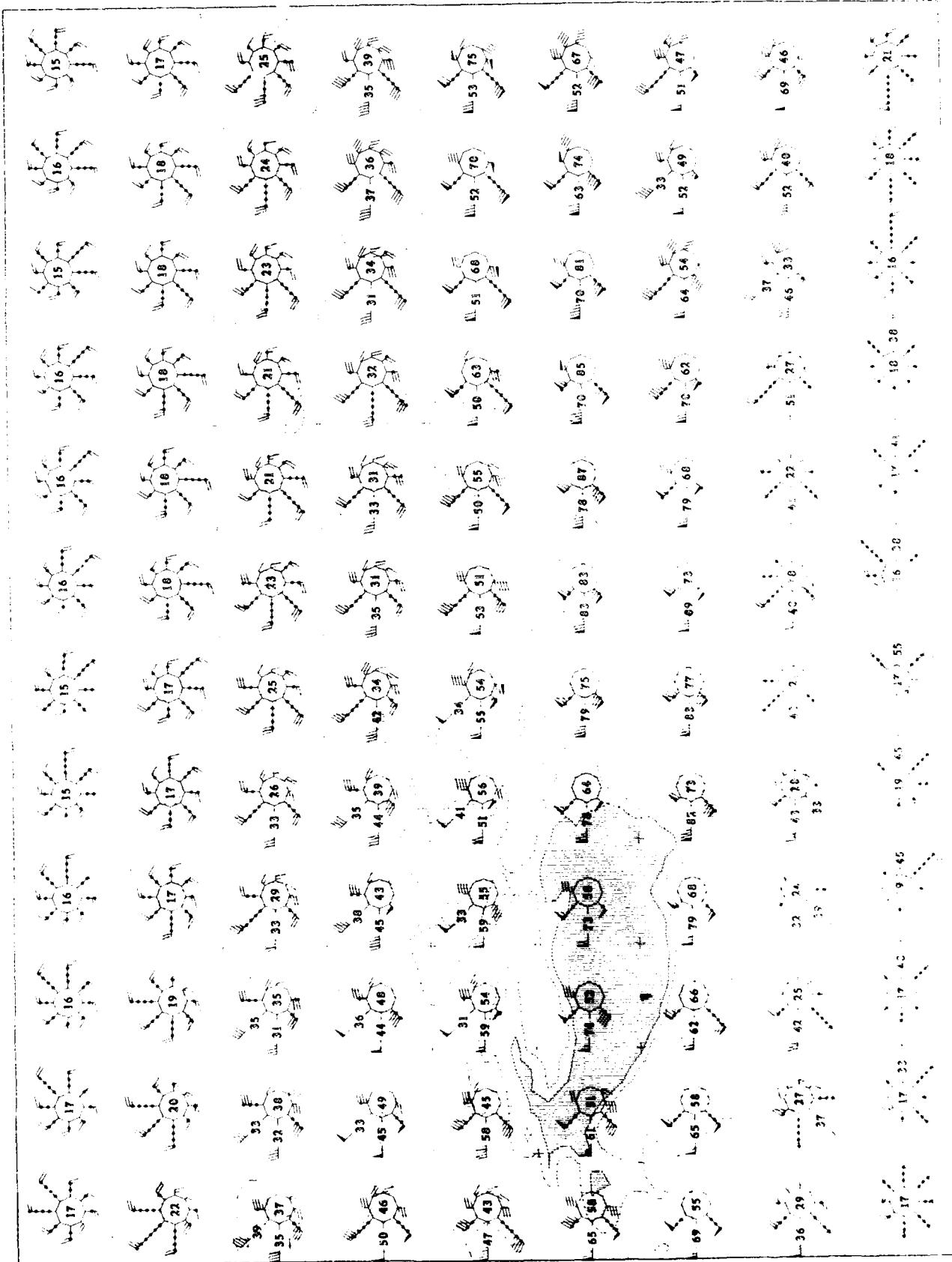
12°S - 30°S
1970-1980
1980-1990

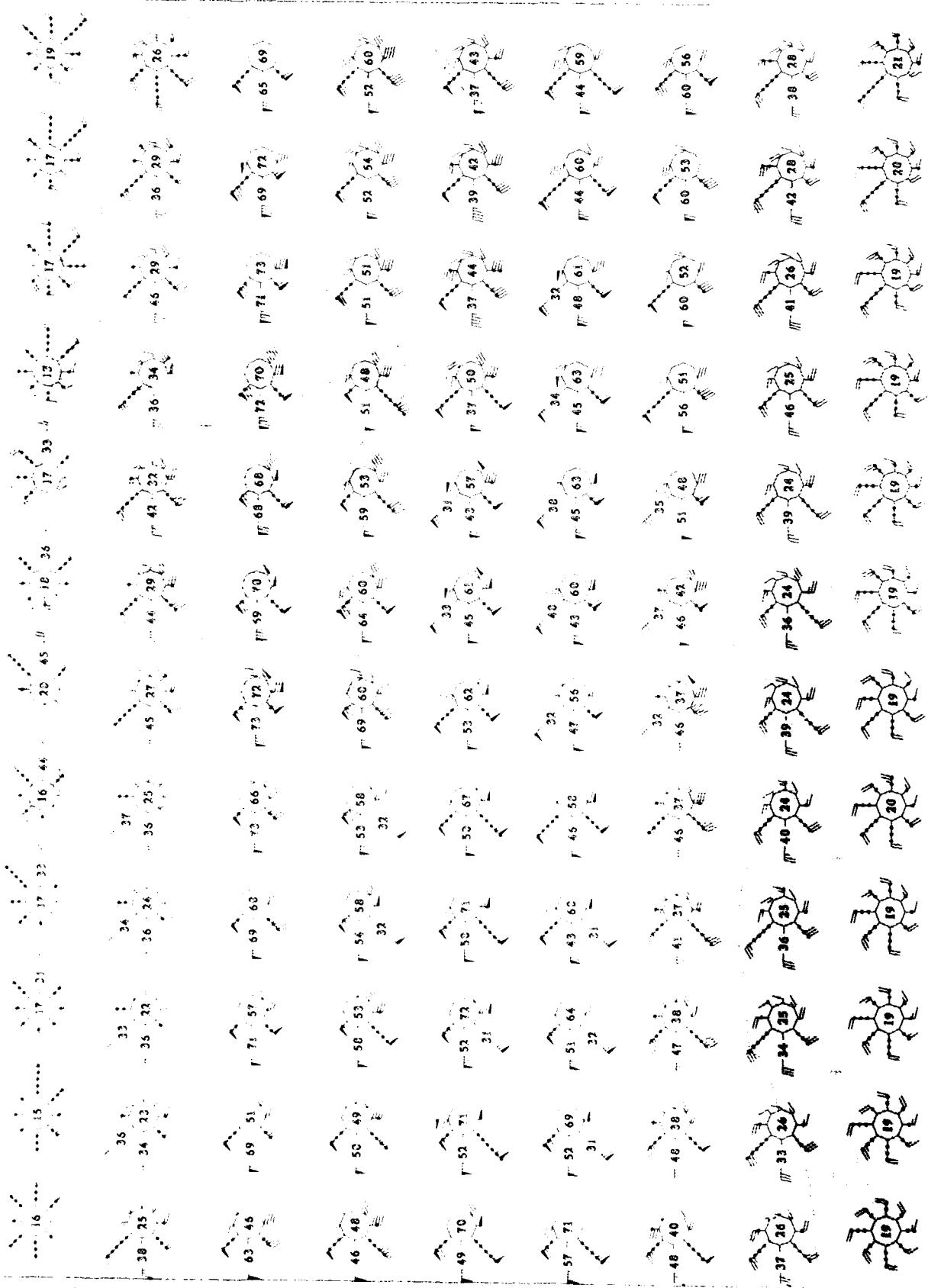
A.P.T.1
250 MHz

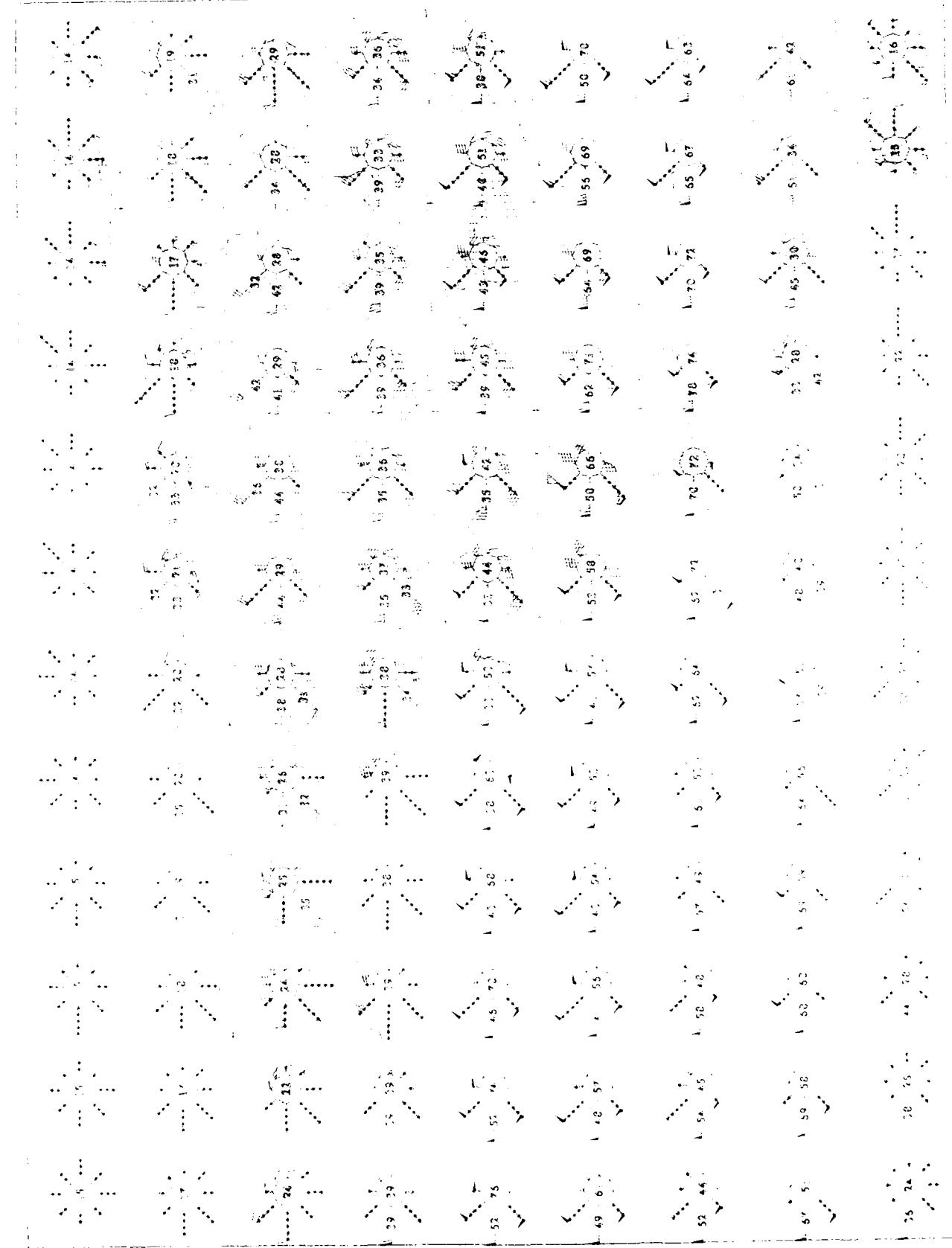


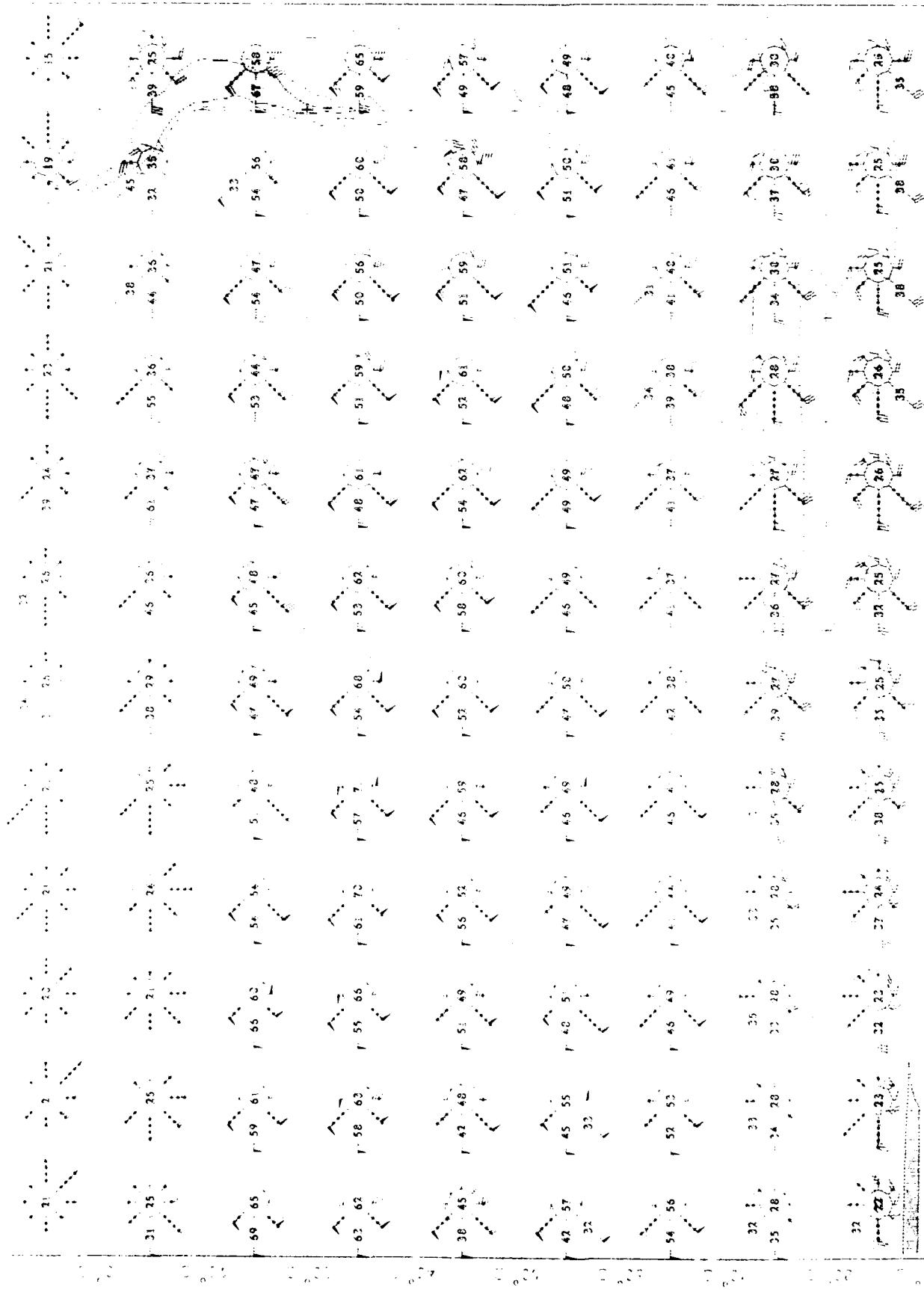


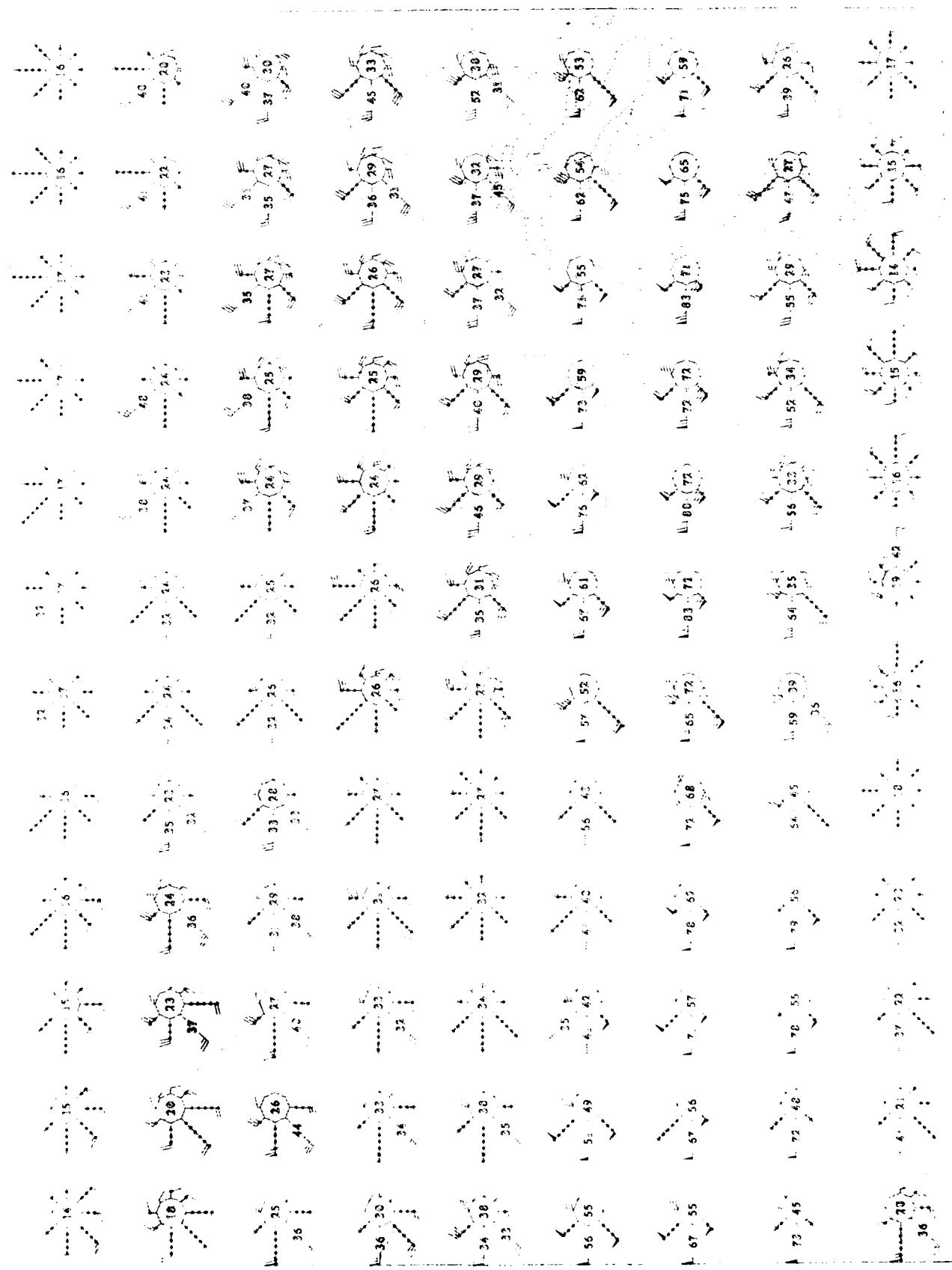


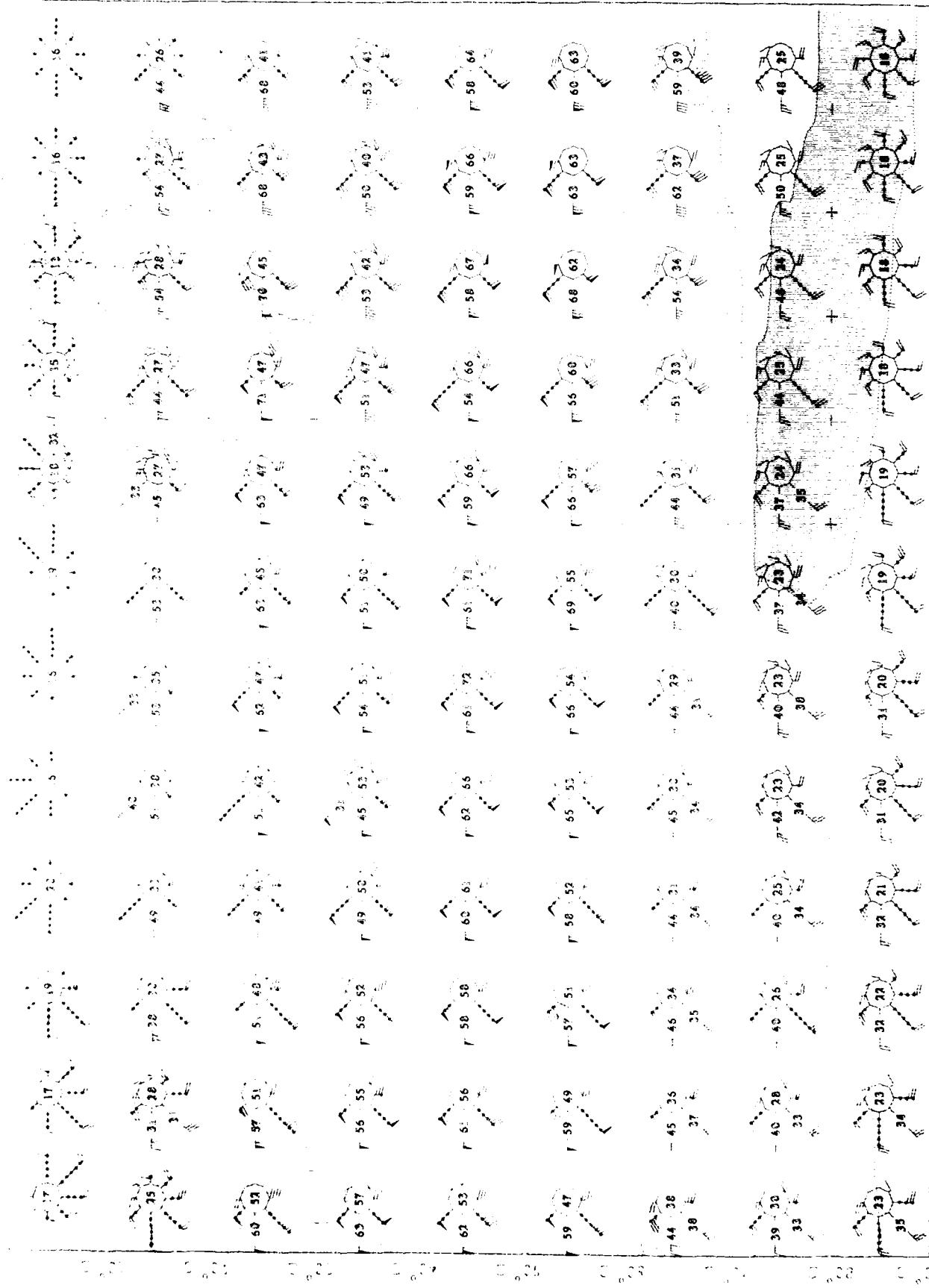


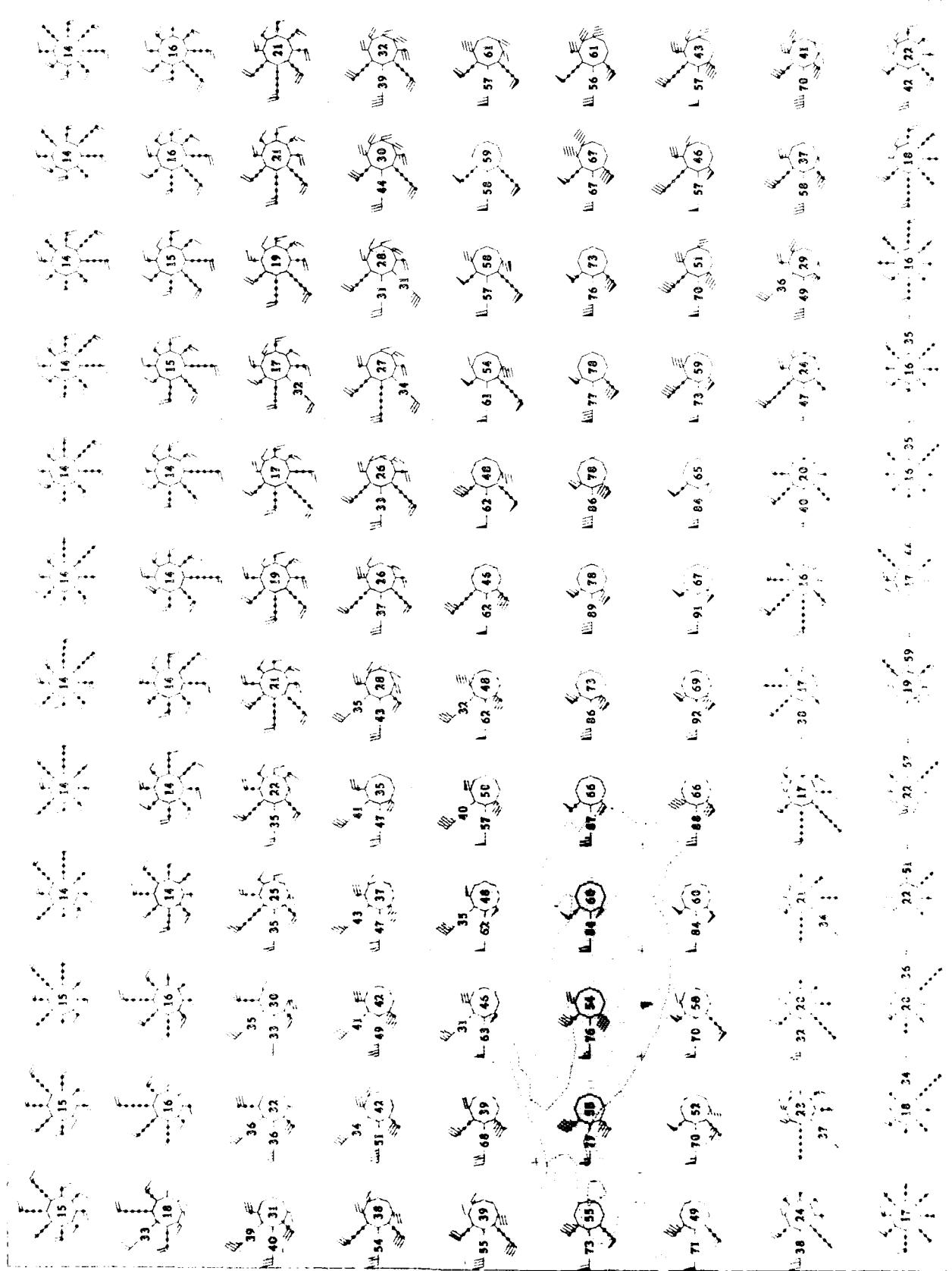


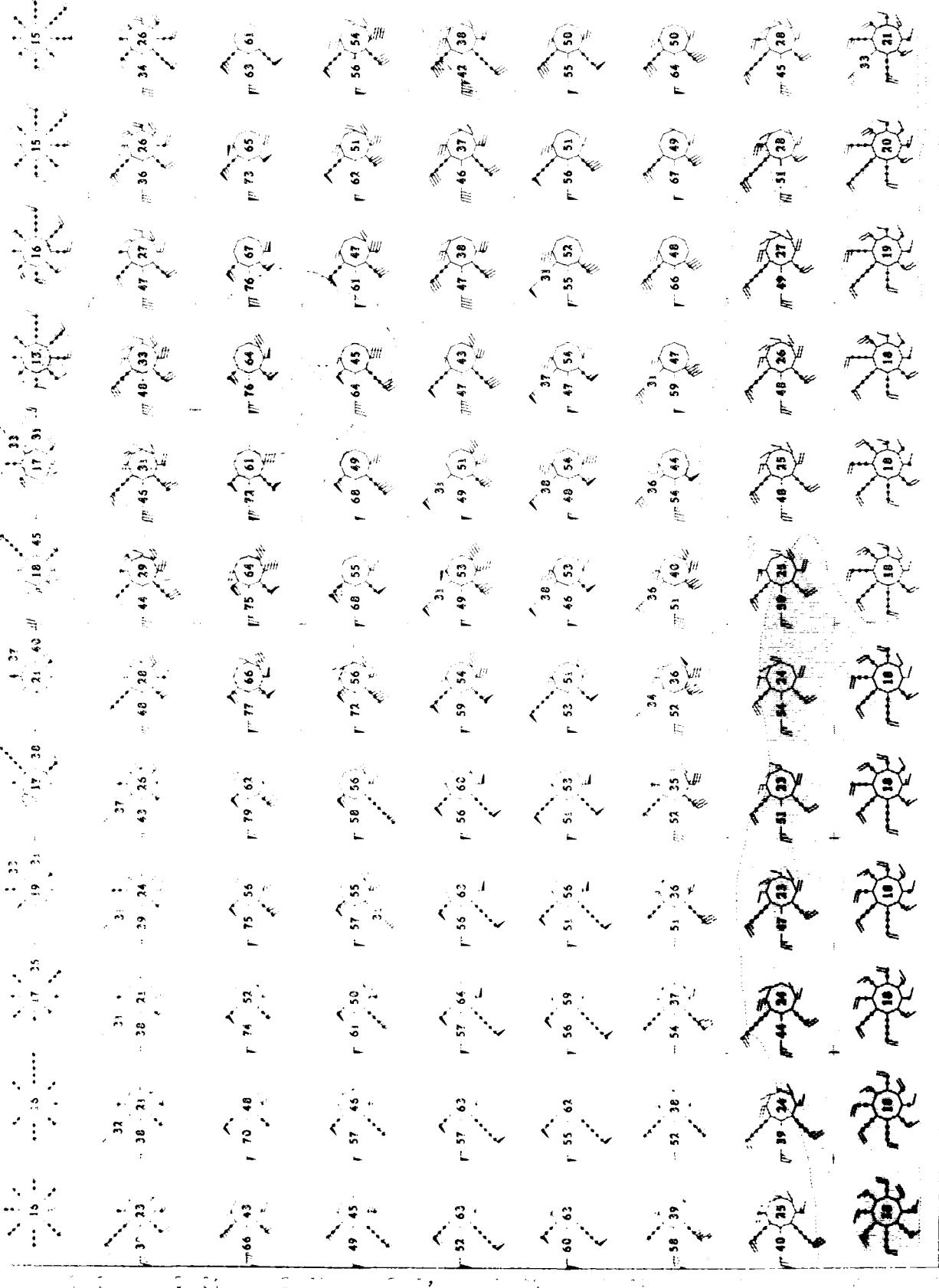


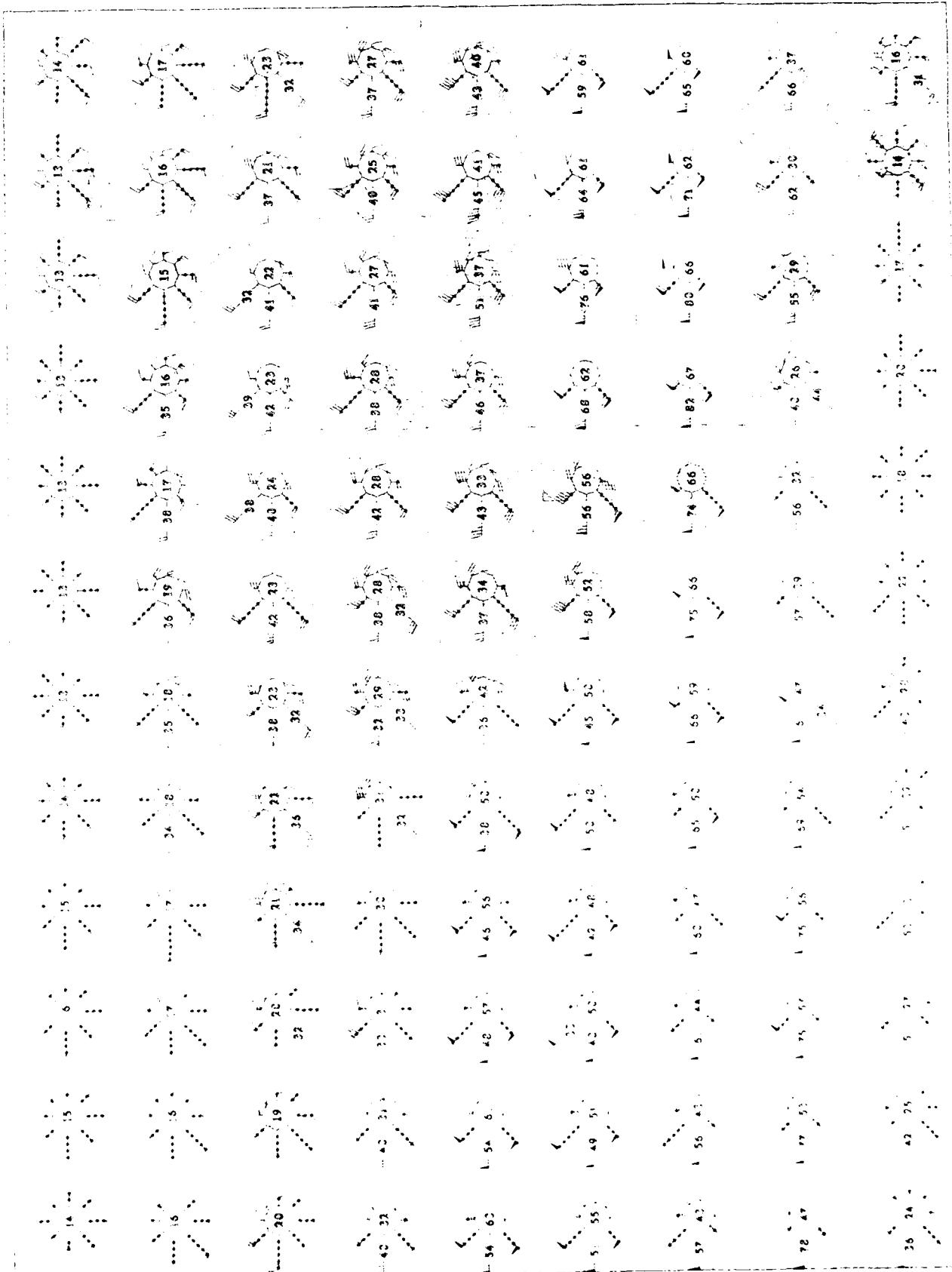


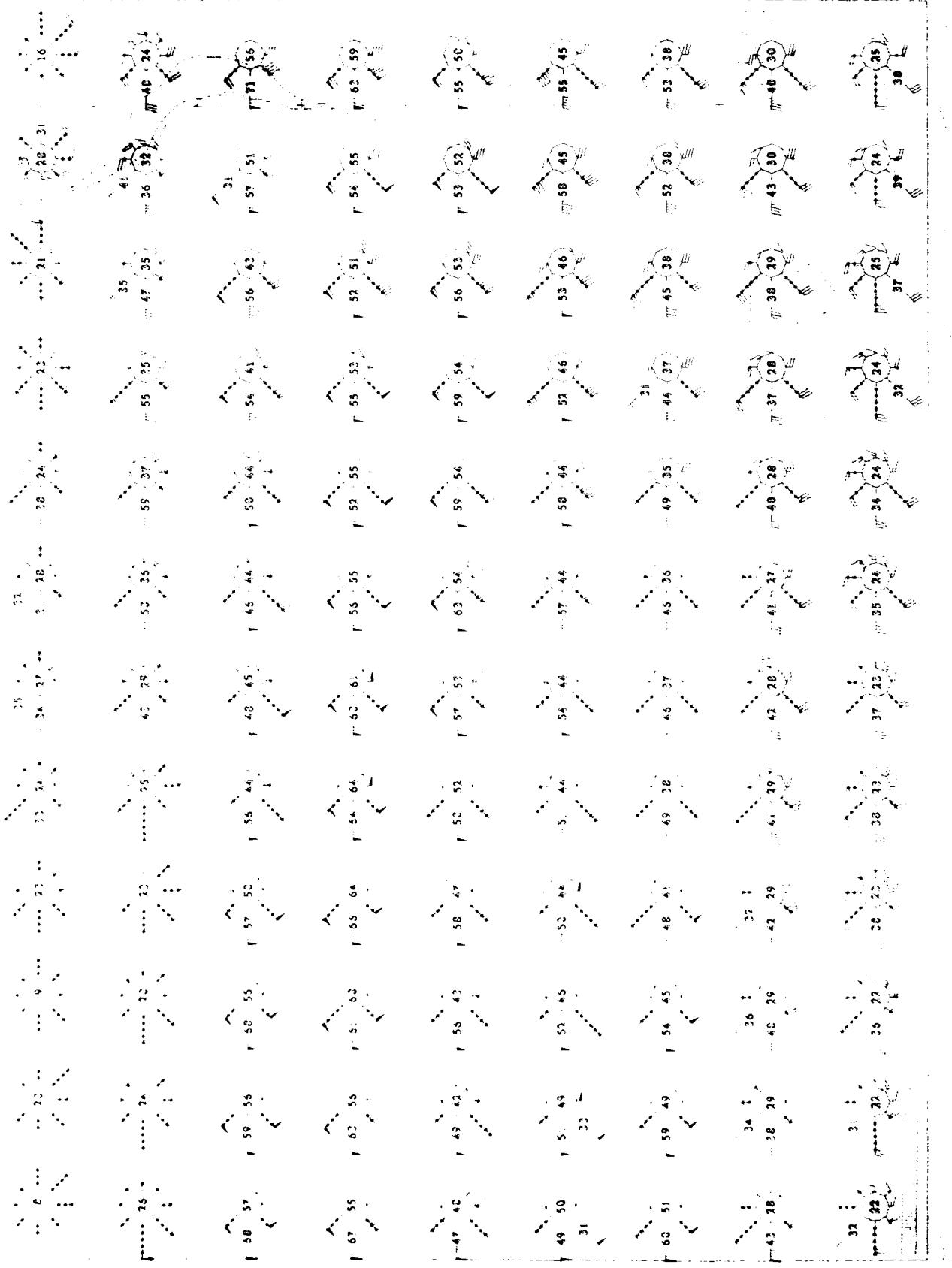




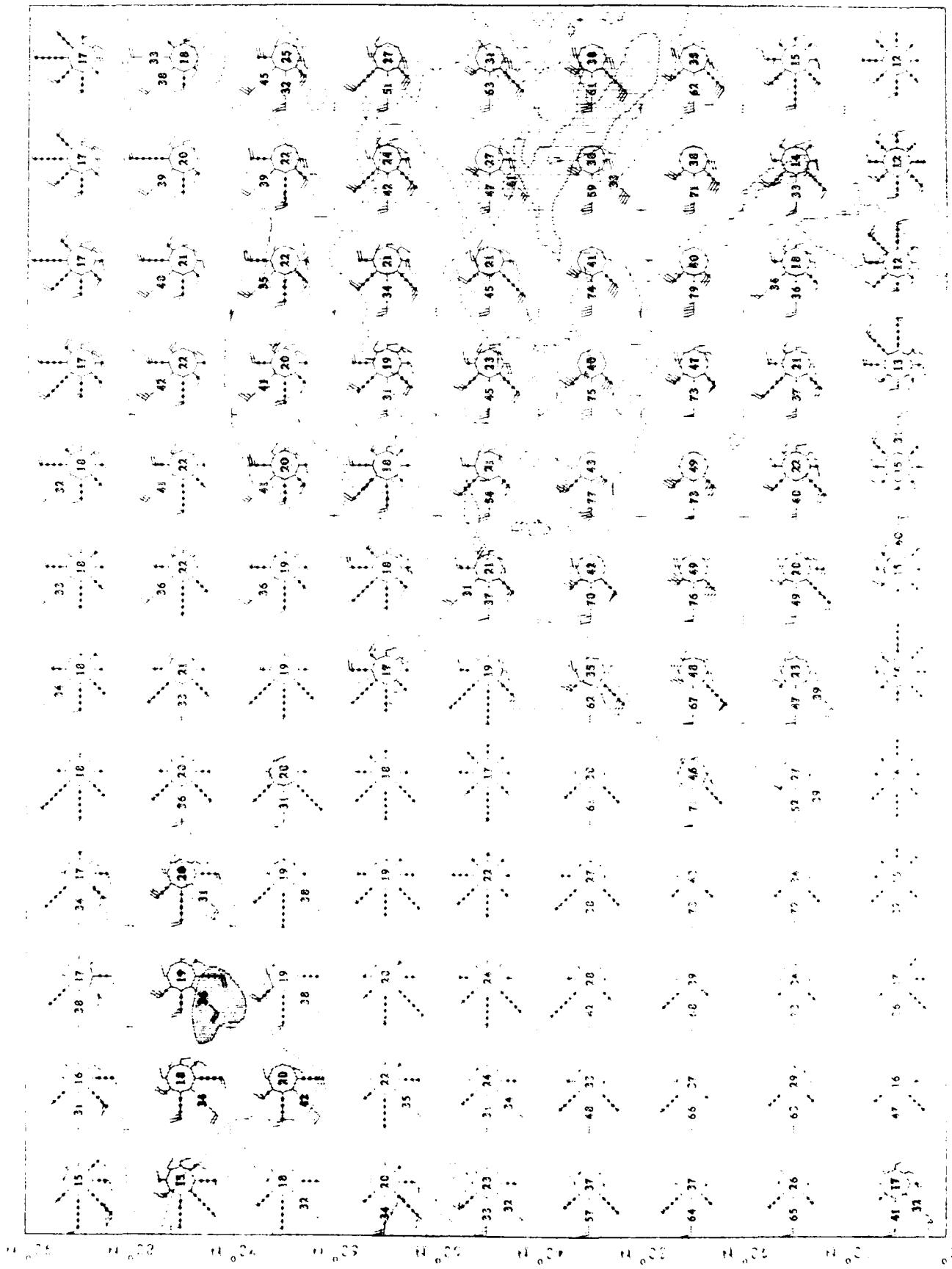


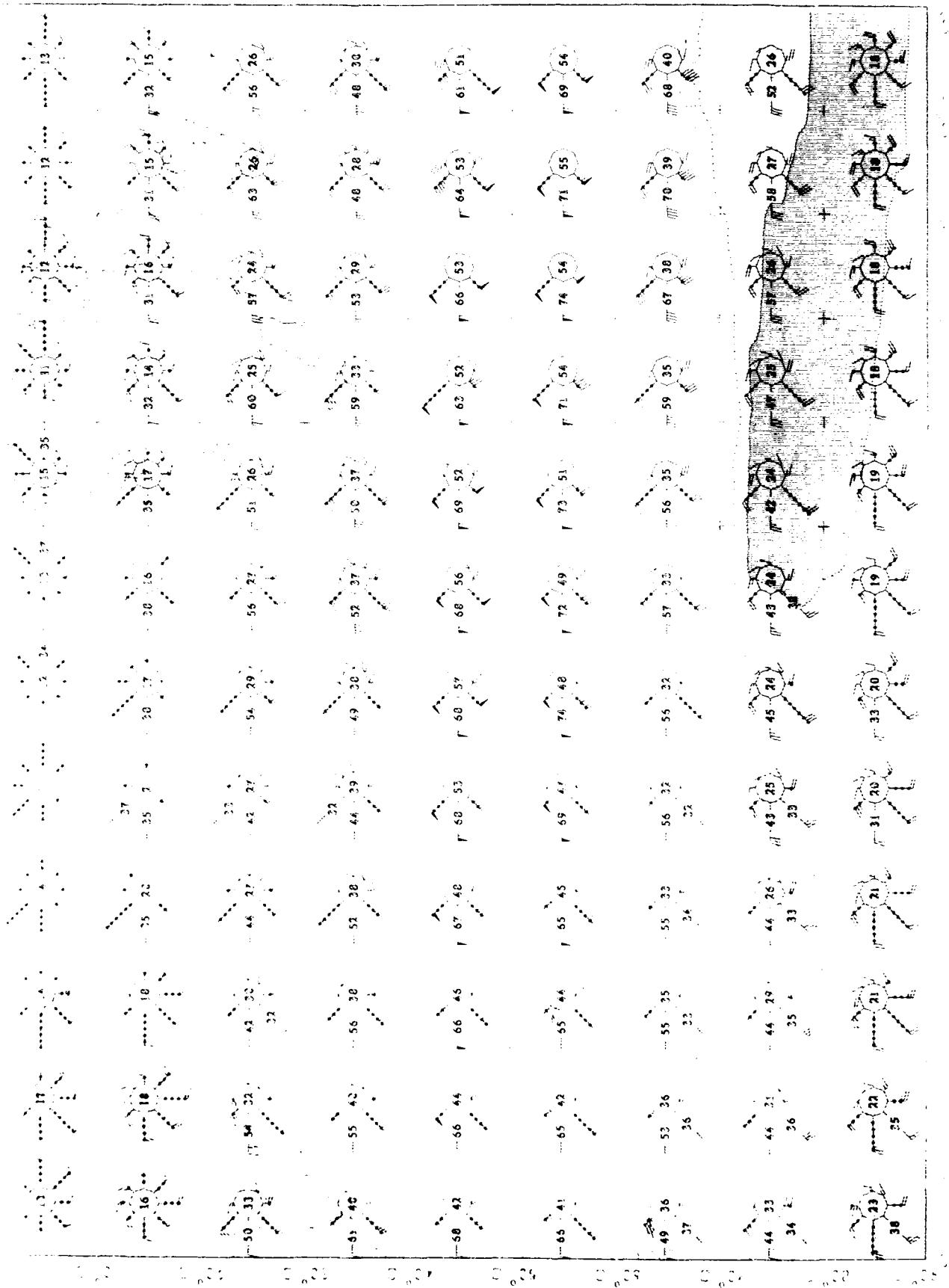


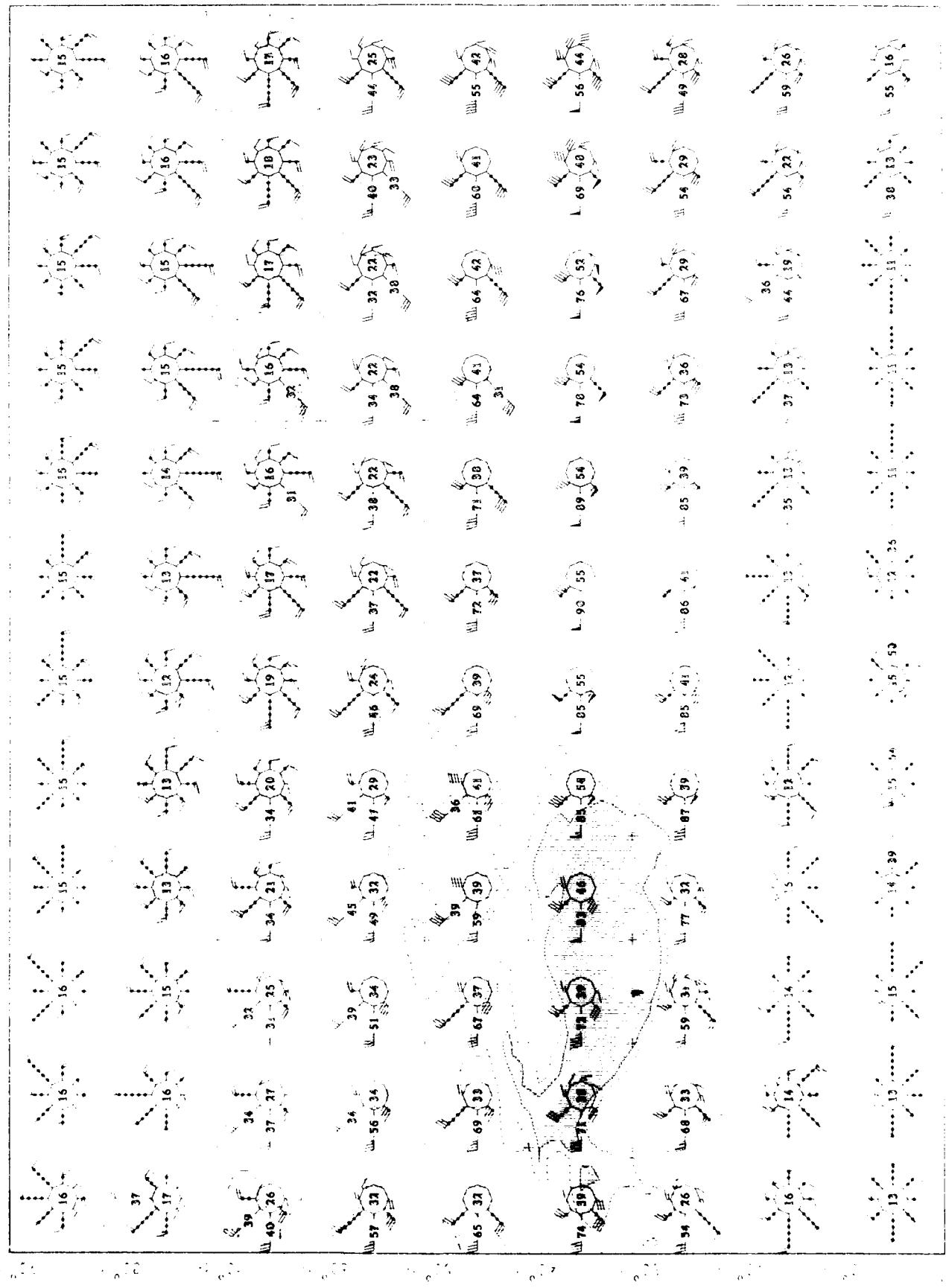


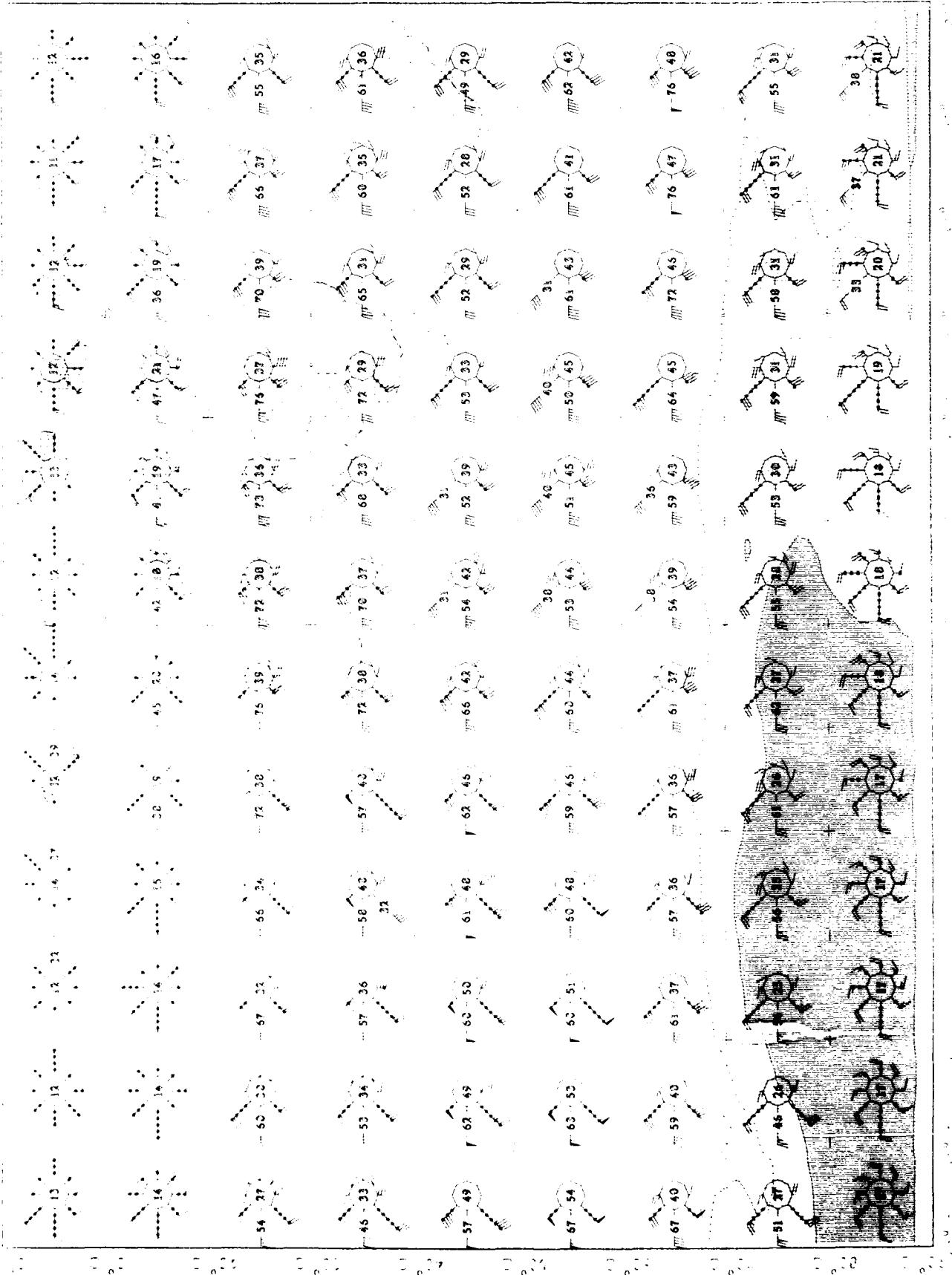


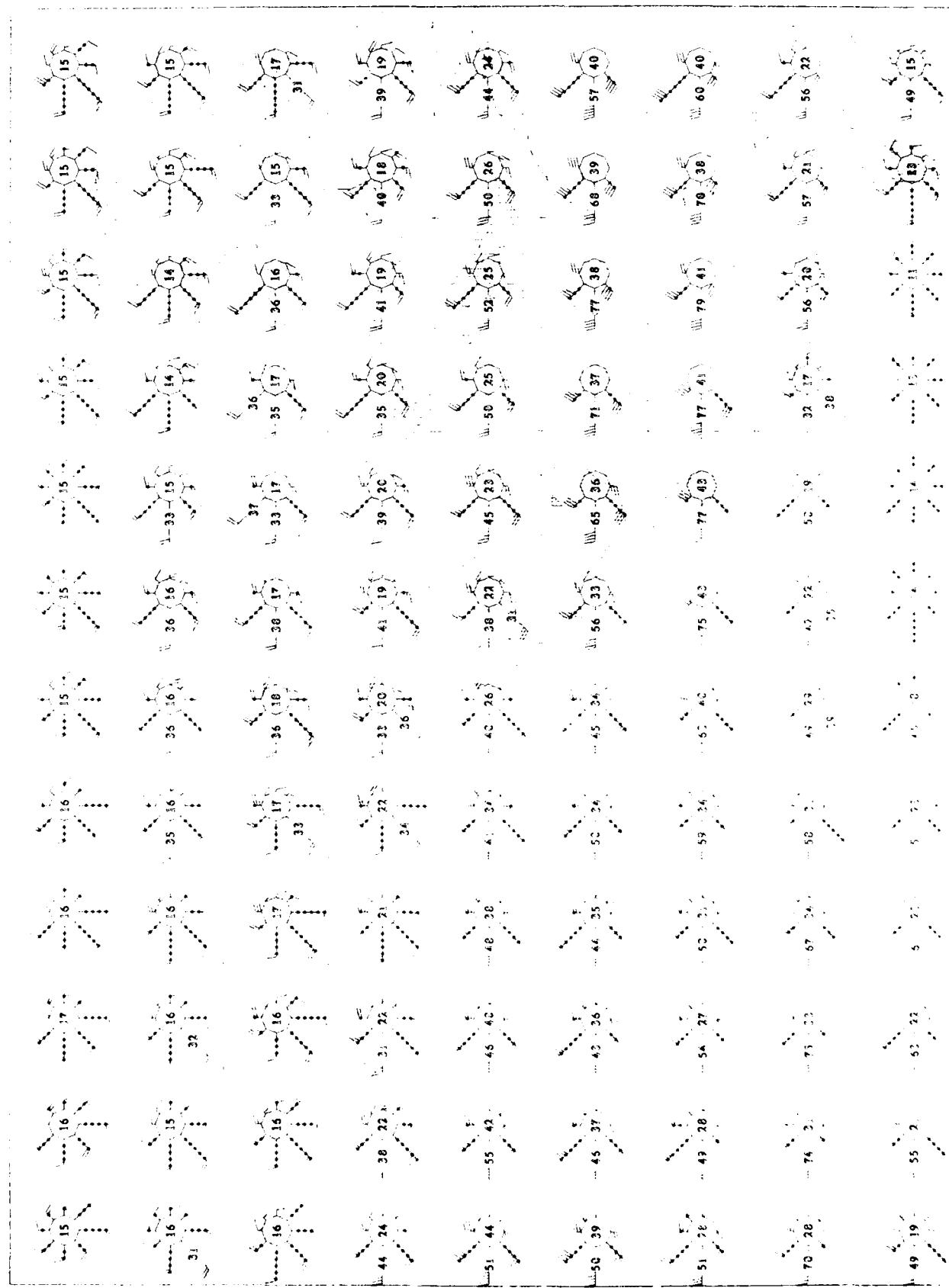
STRUCTURE 31
STRUCTURE 32
STRUCTURE 33
STRUCTURE 34
STRUCTURE 35
STRUCTURE 36
STRUCTURE 37
STRUCTURE 38
STRUCTURE 39
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STRUCTURE 41
STRUCTURE 42
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STRUCTURE 66
STRUCTURE 67
STRUCTURE 68
STRUCTURE 69
STRUCTURE 70

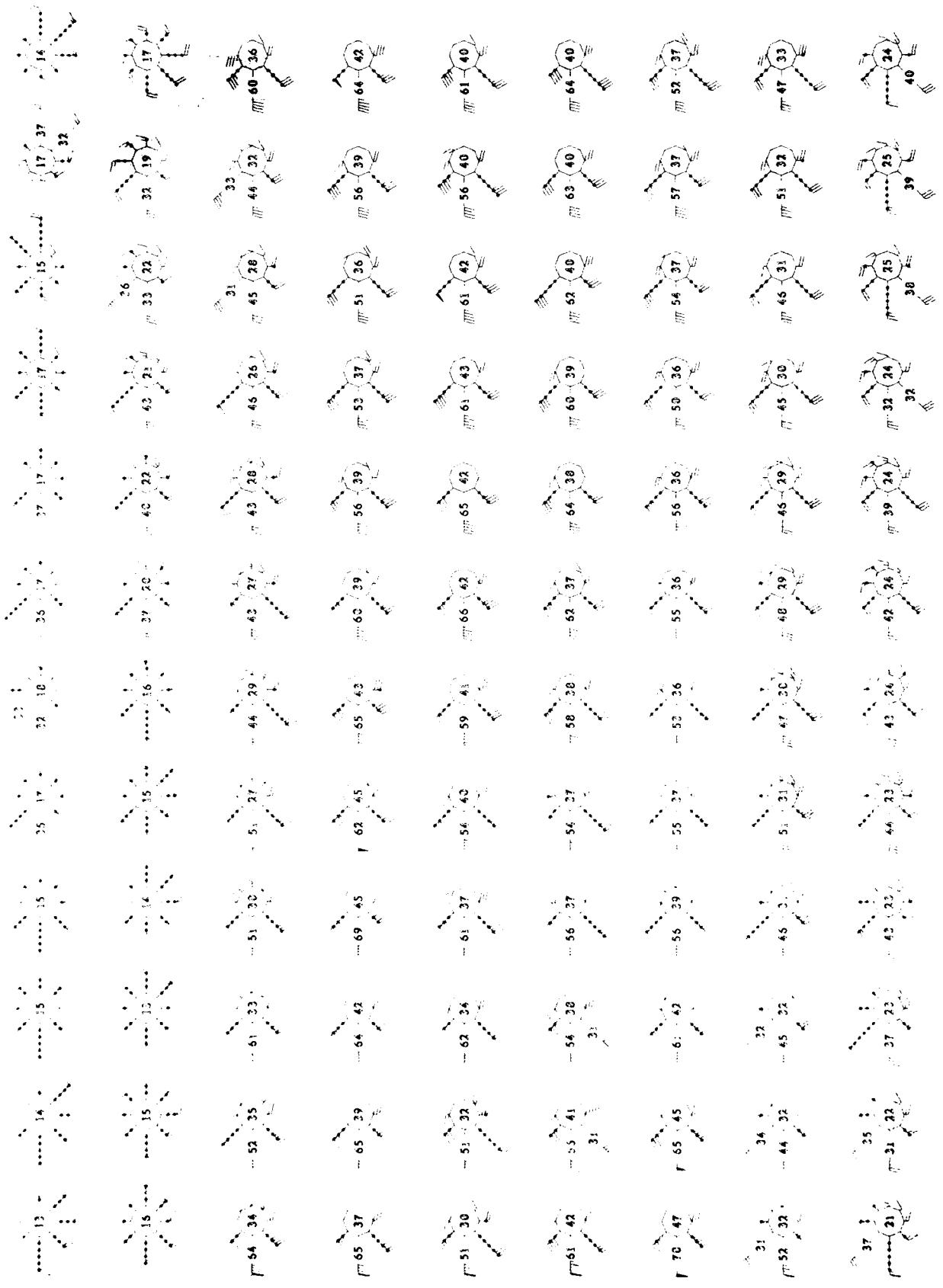


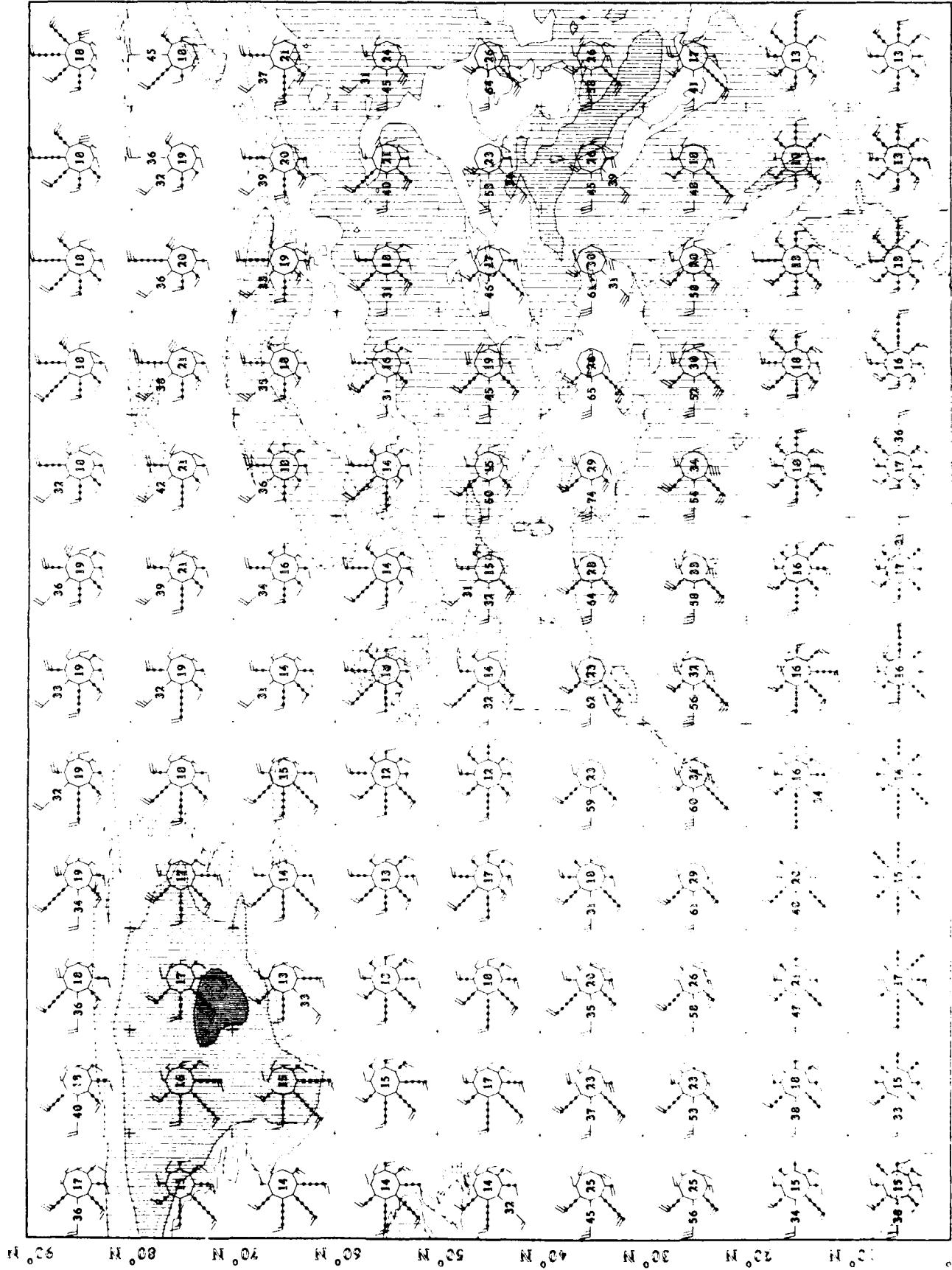


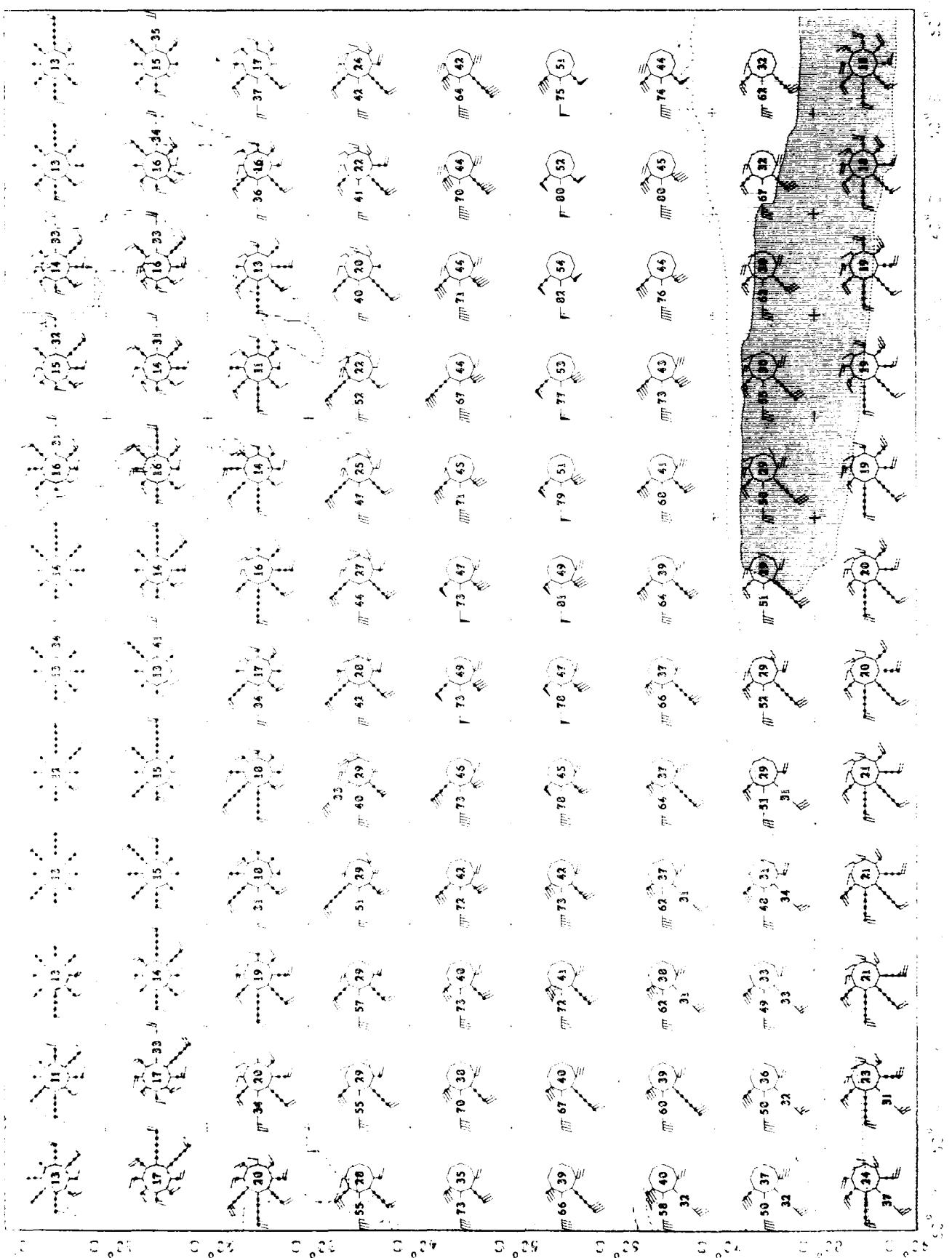


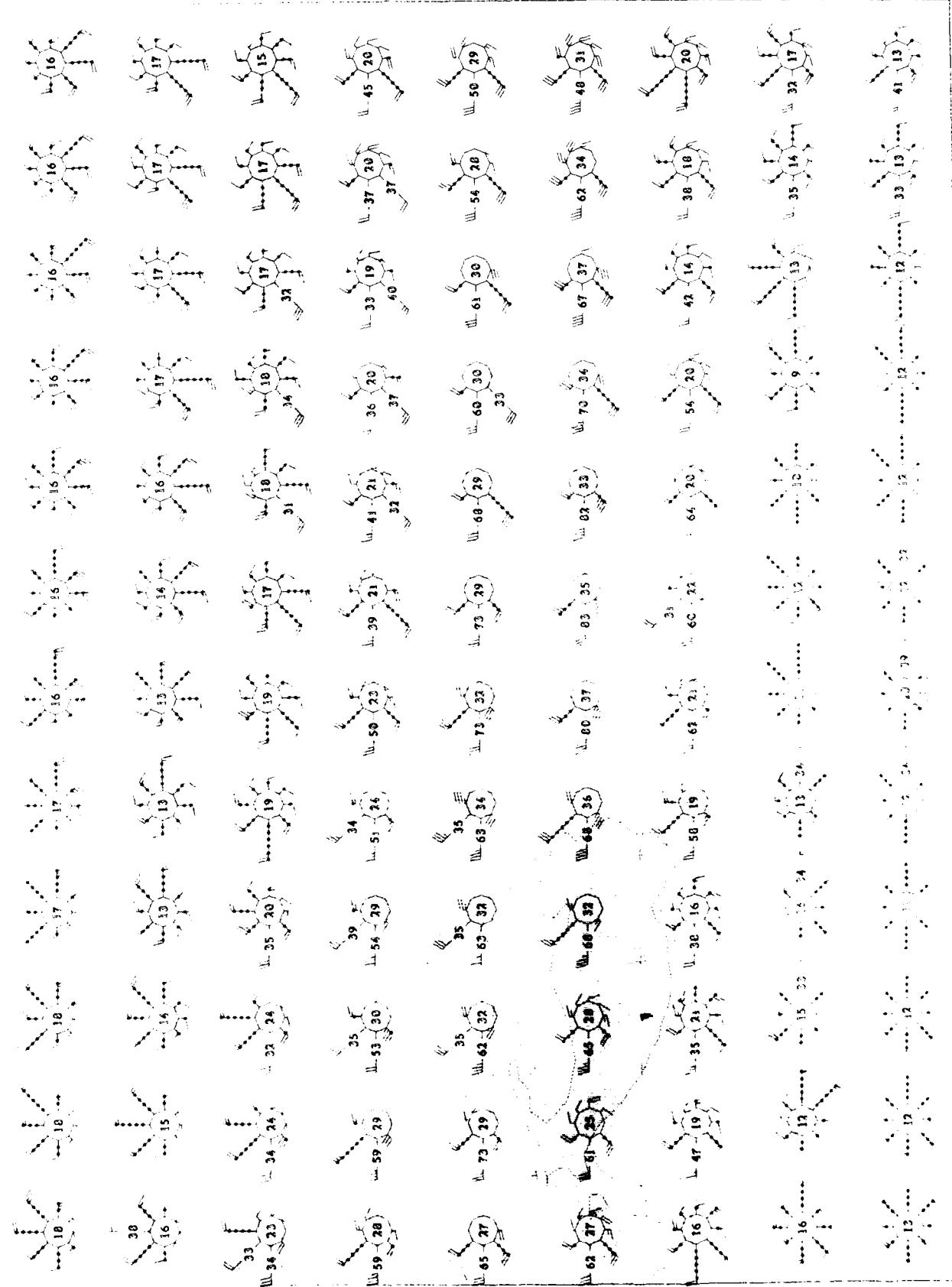


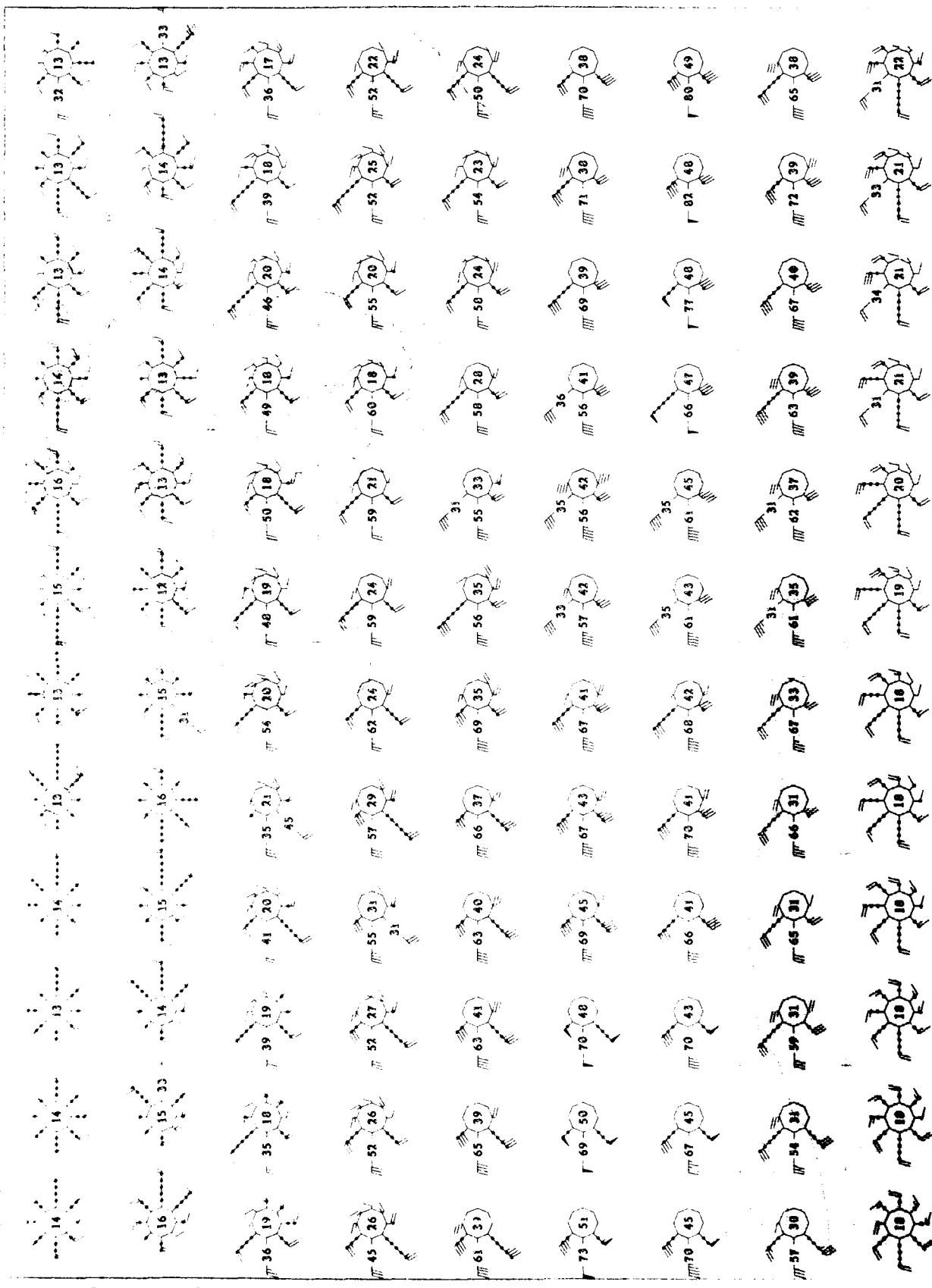


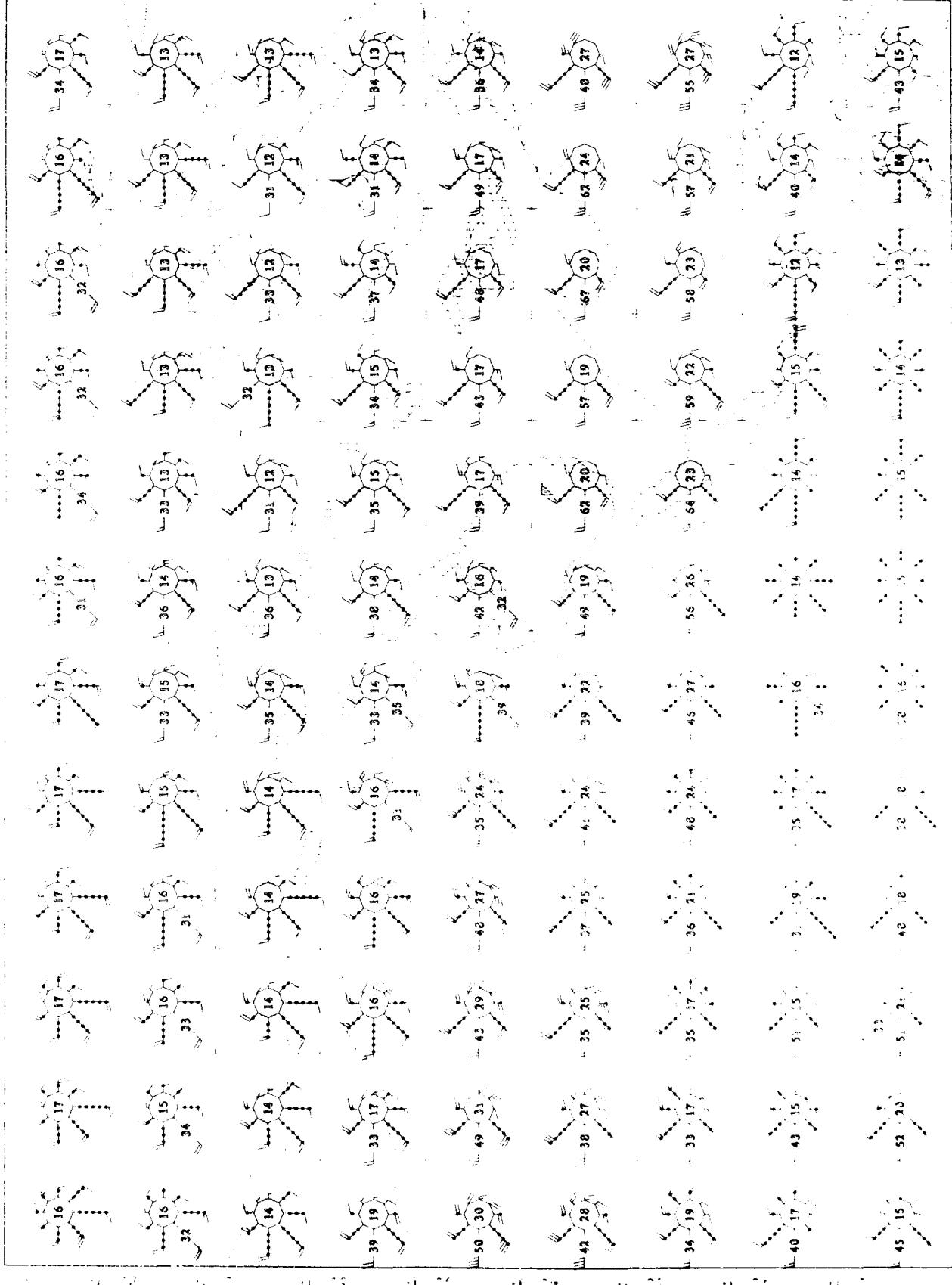


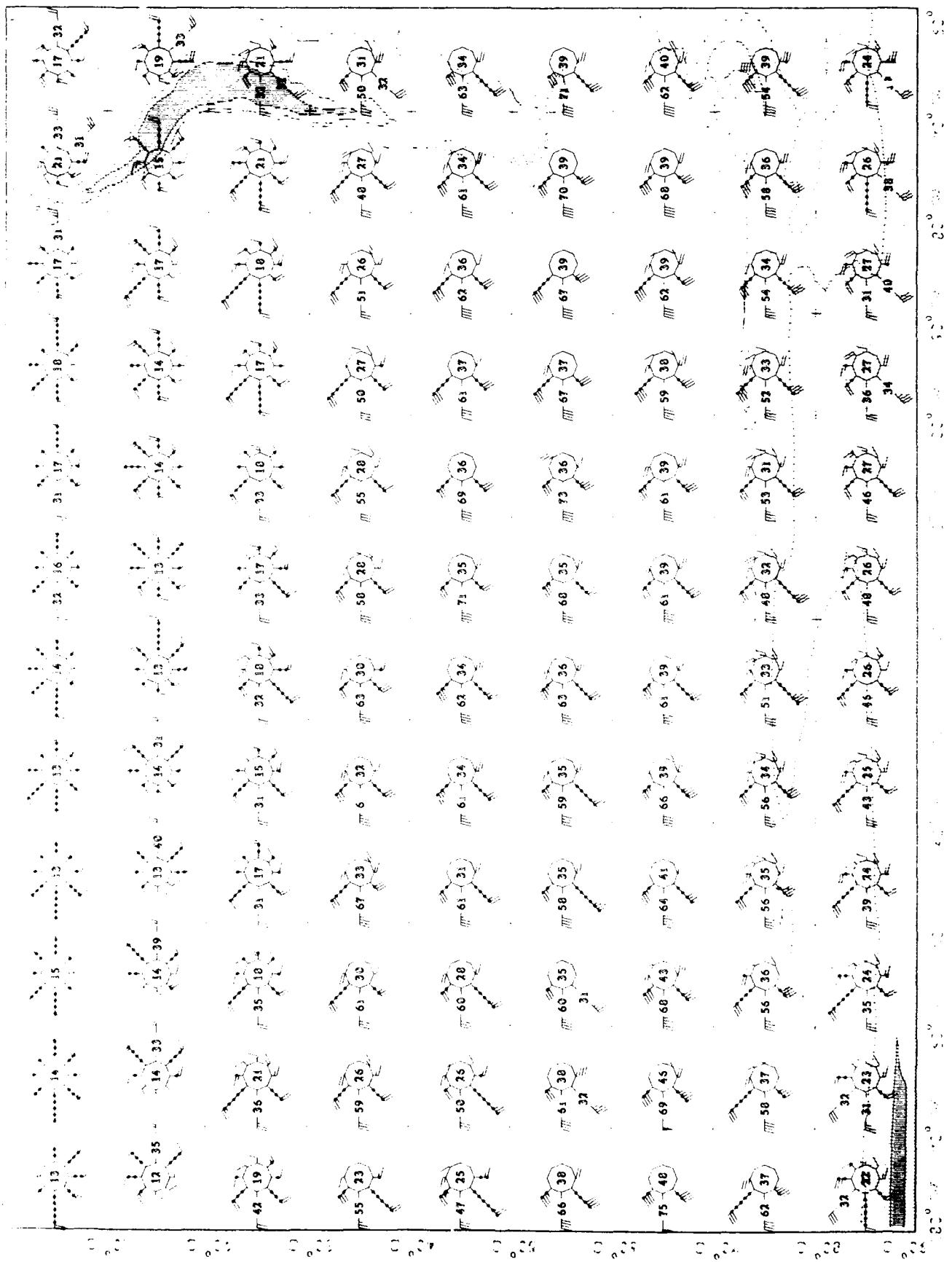








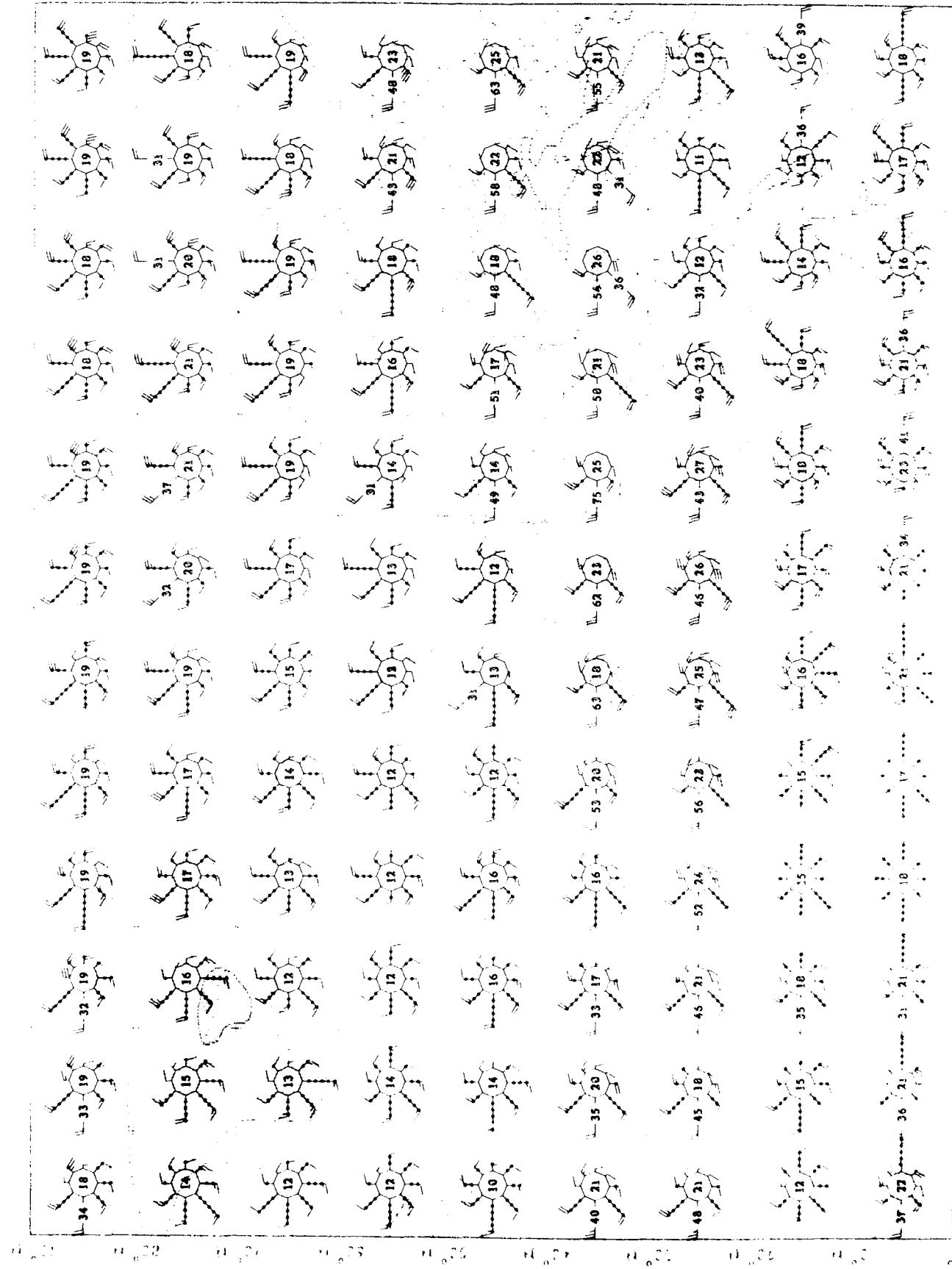


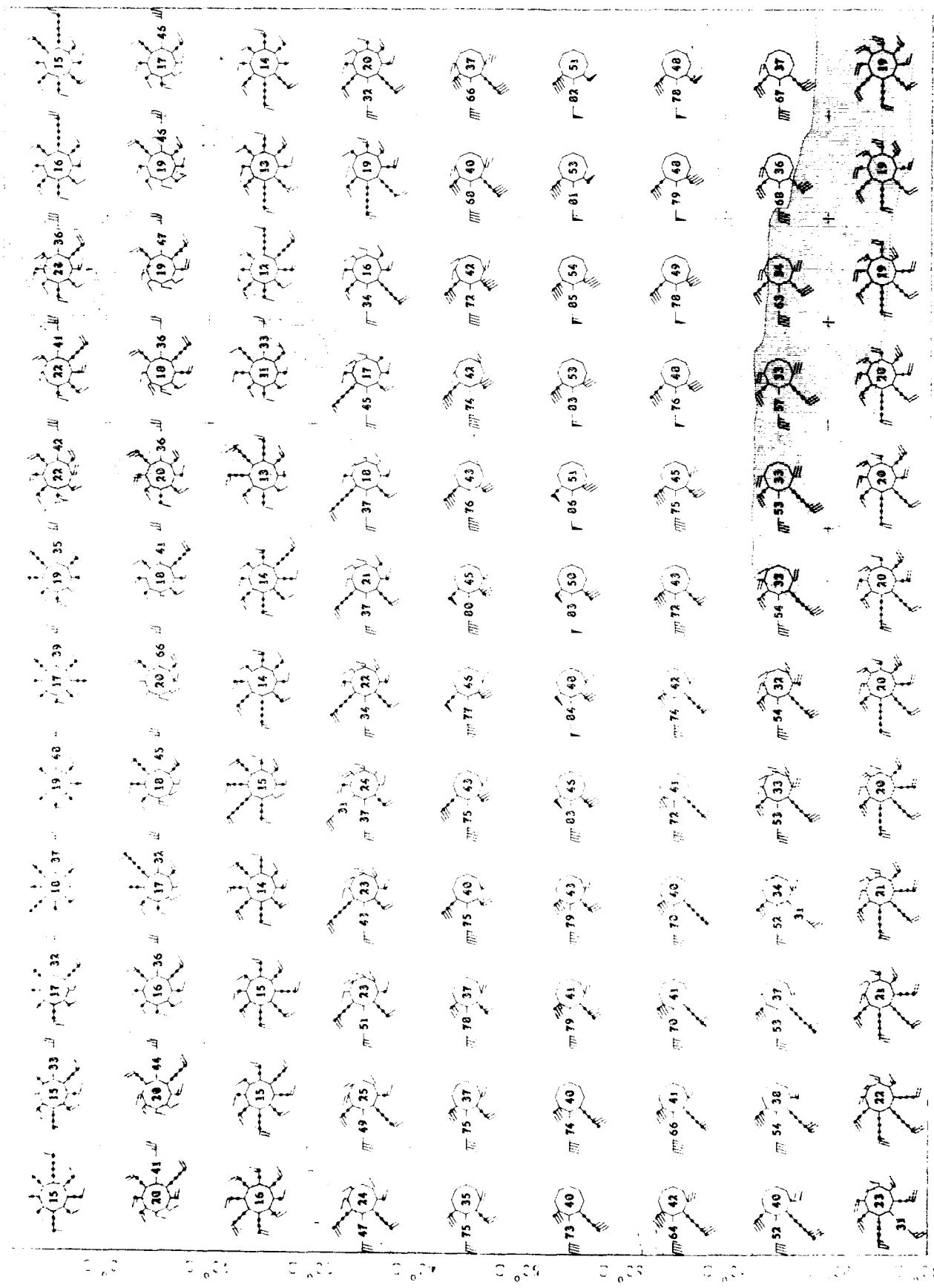


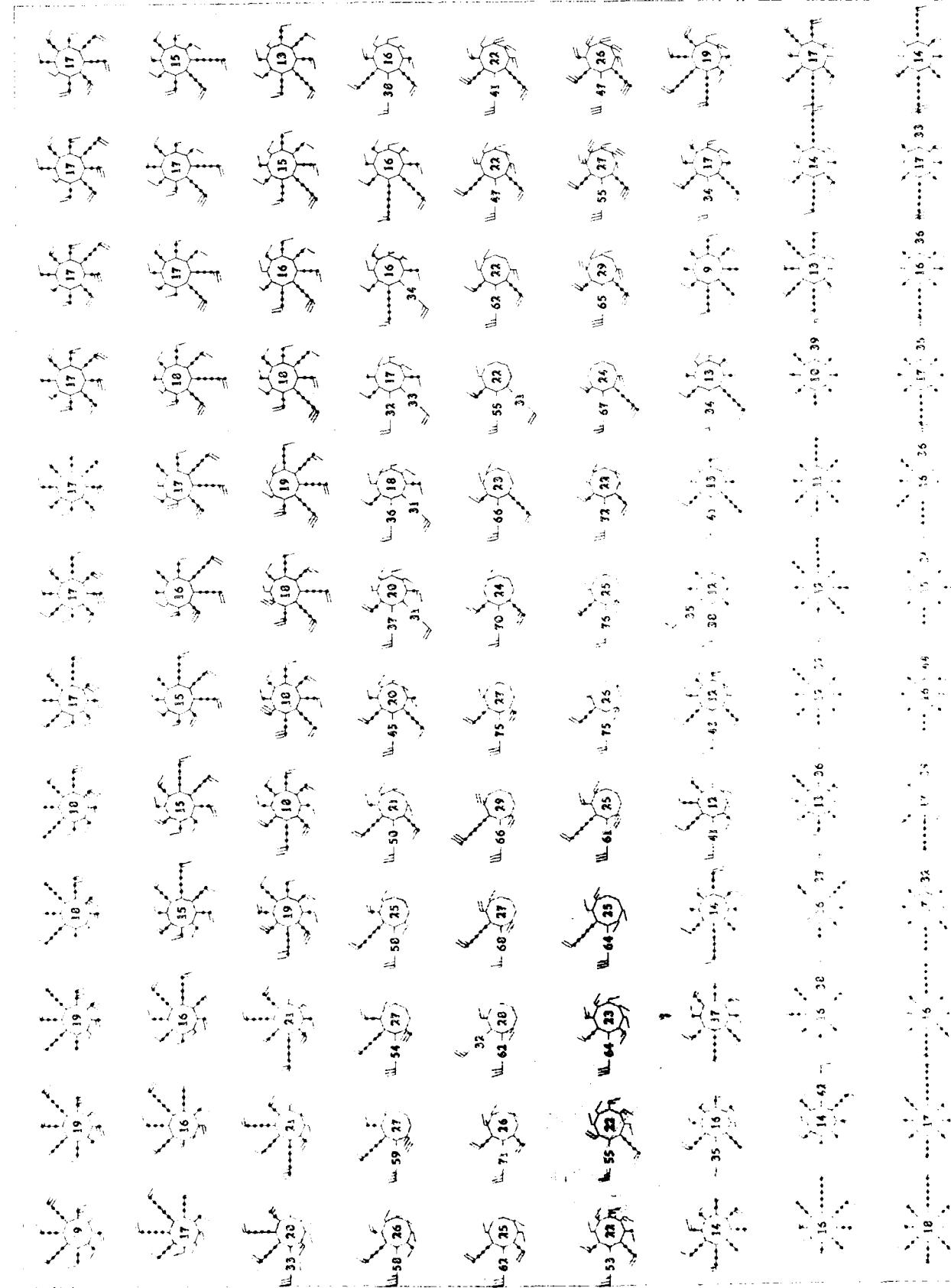
Geographic Distribution
Northern Hemisphere

Geographic
Regions

Geographic
Regions







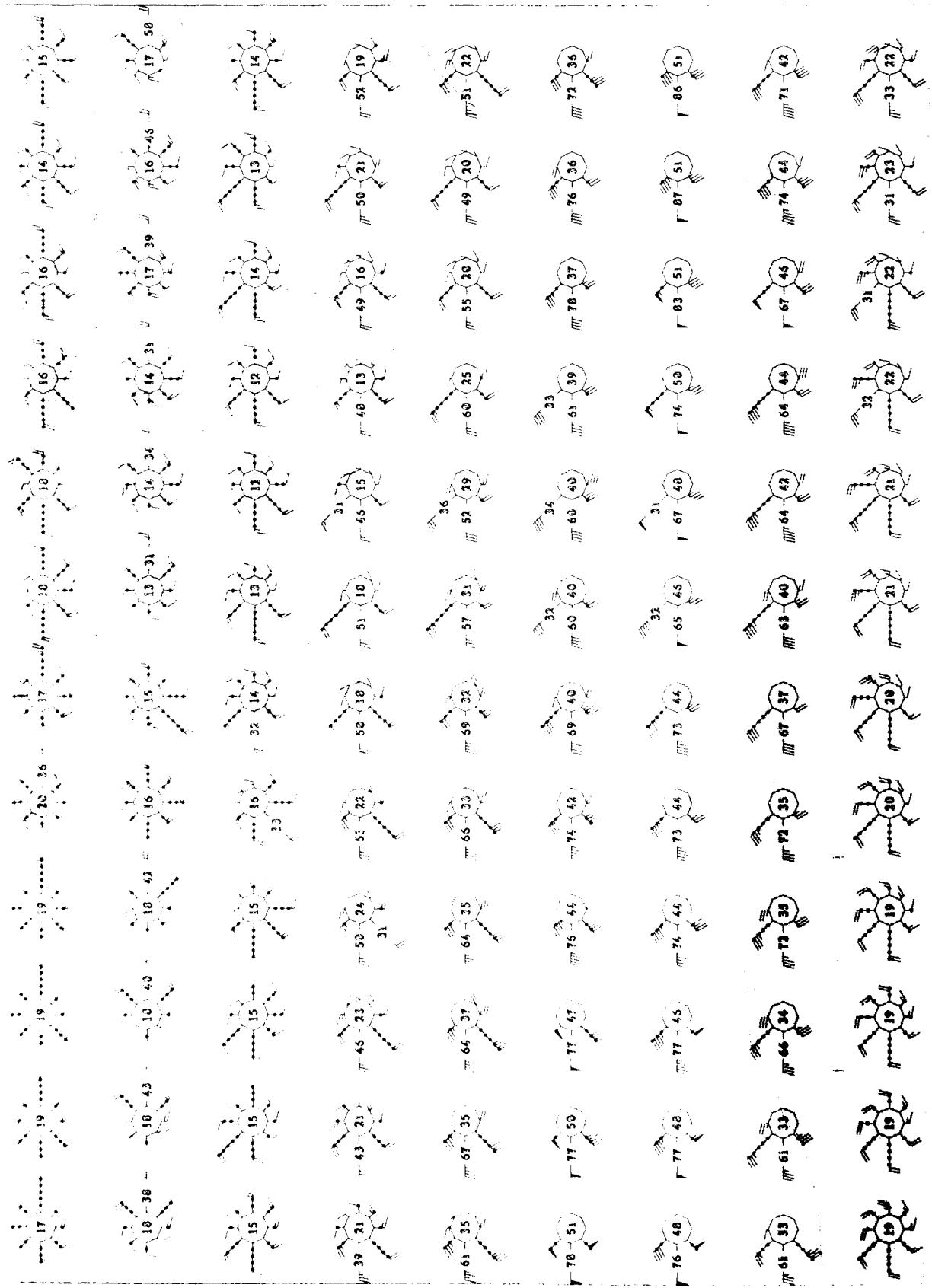
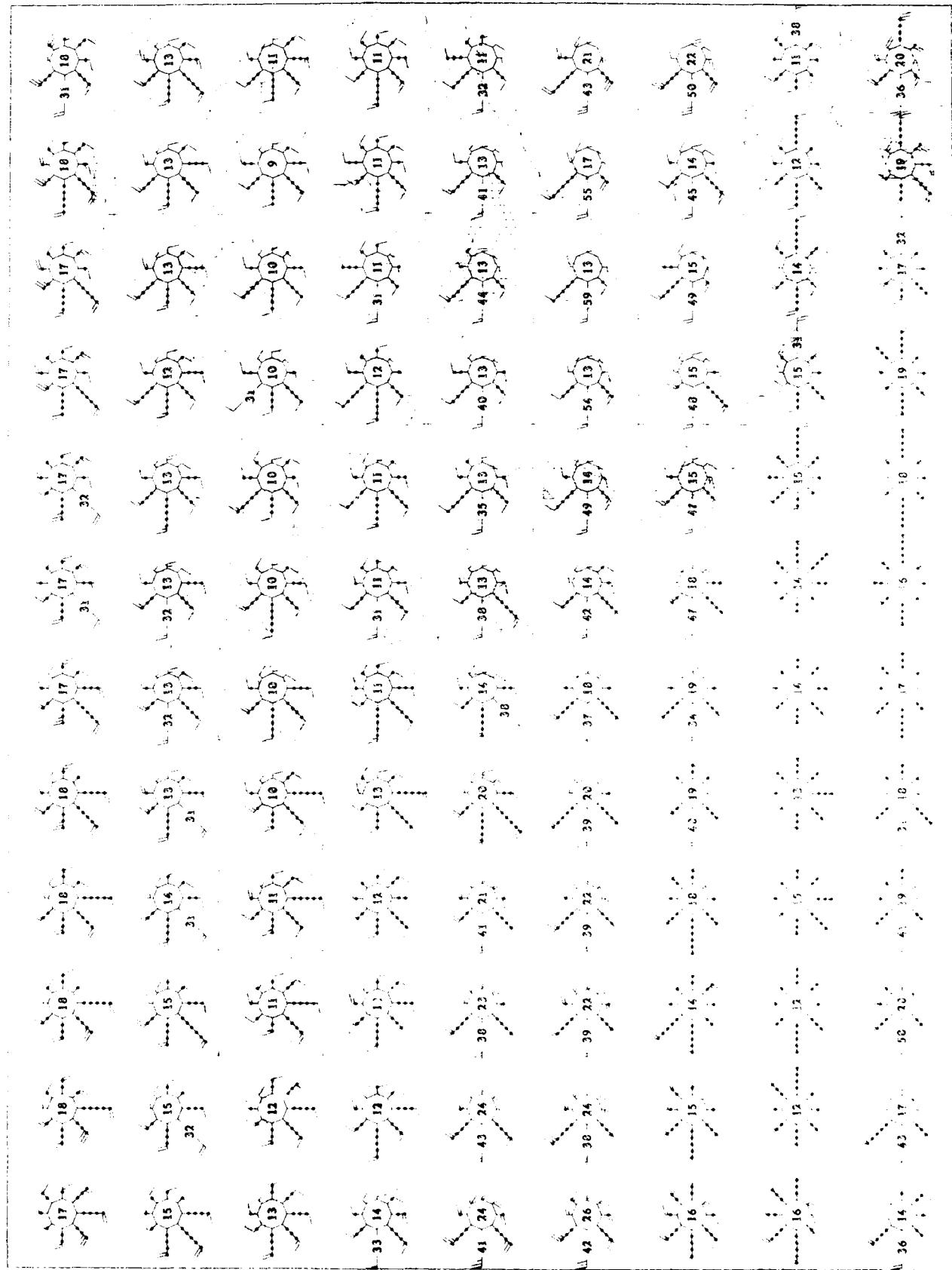
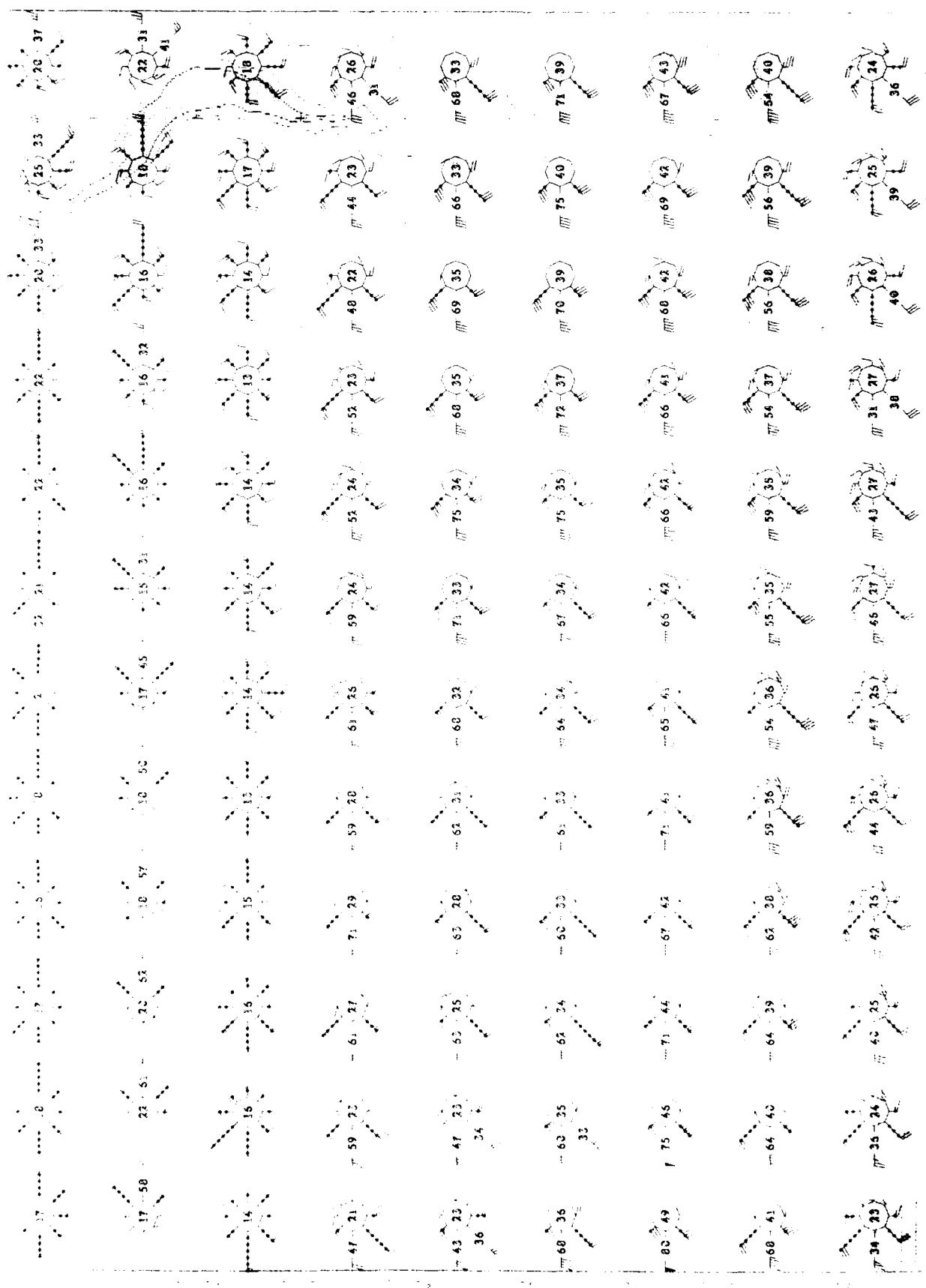


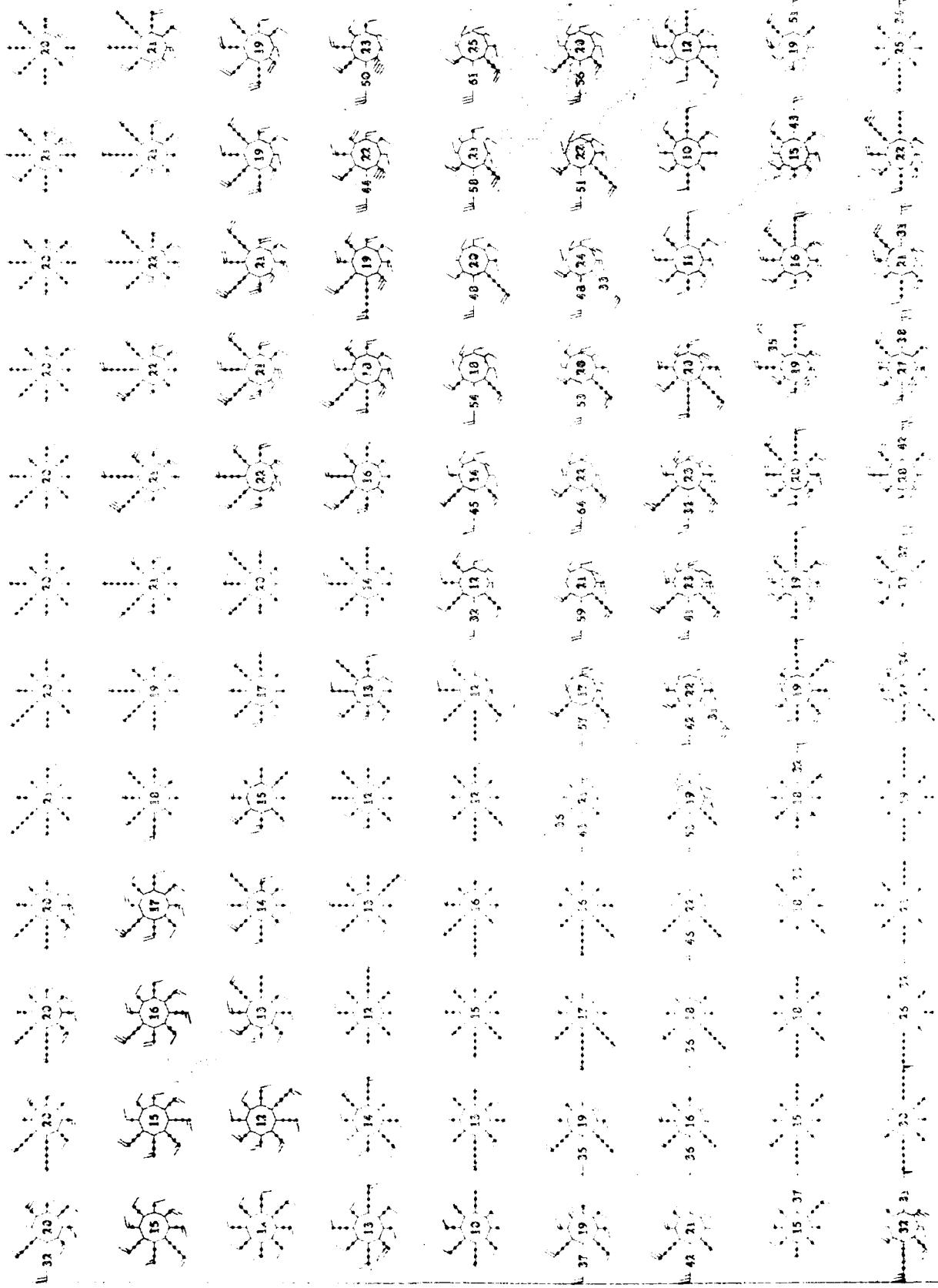
Fig. 21. *Alpinia* (L.) Schlecht.
Northern Hemisphere

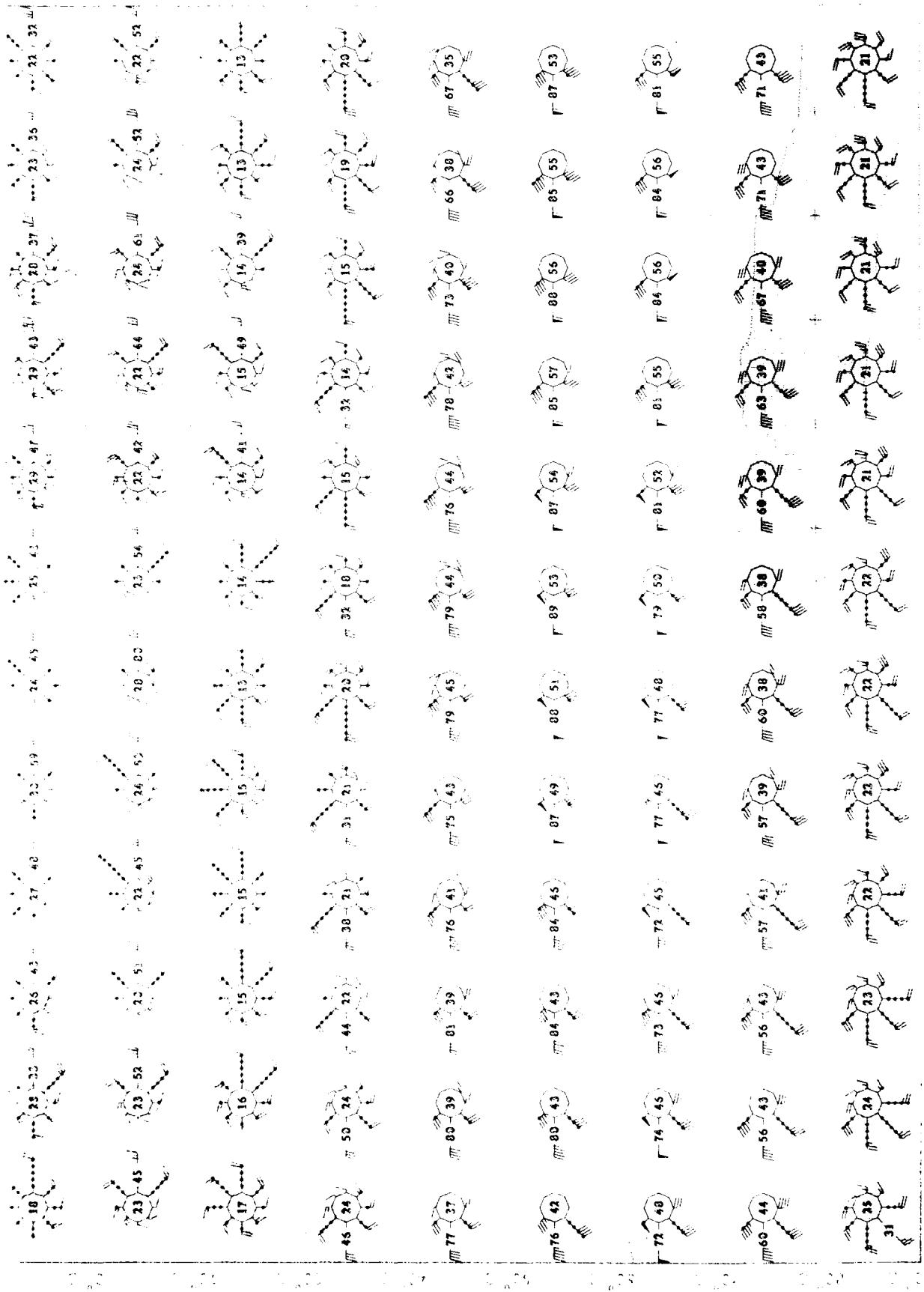
Plates 22-25

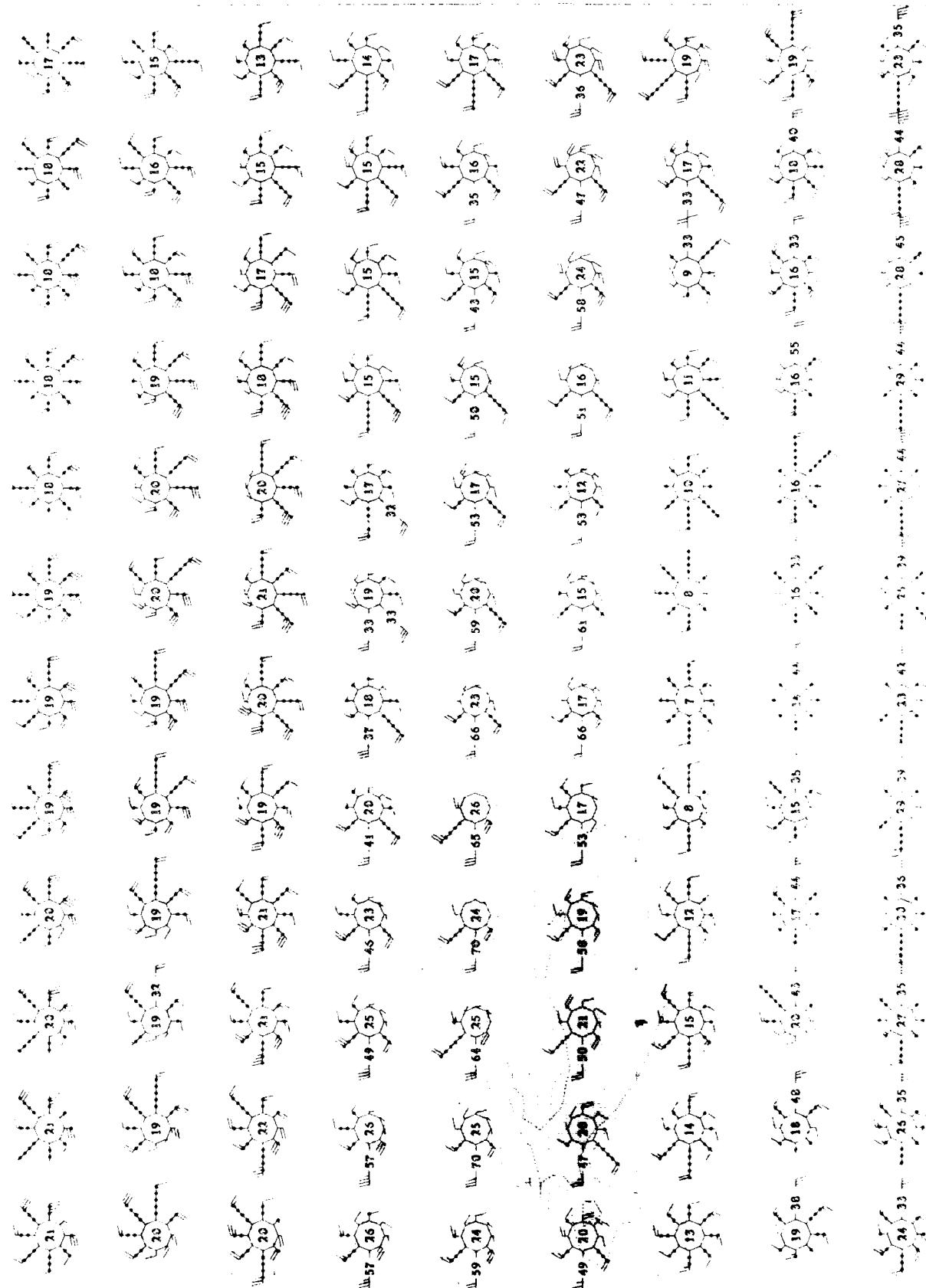
Pl. 22

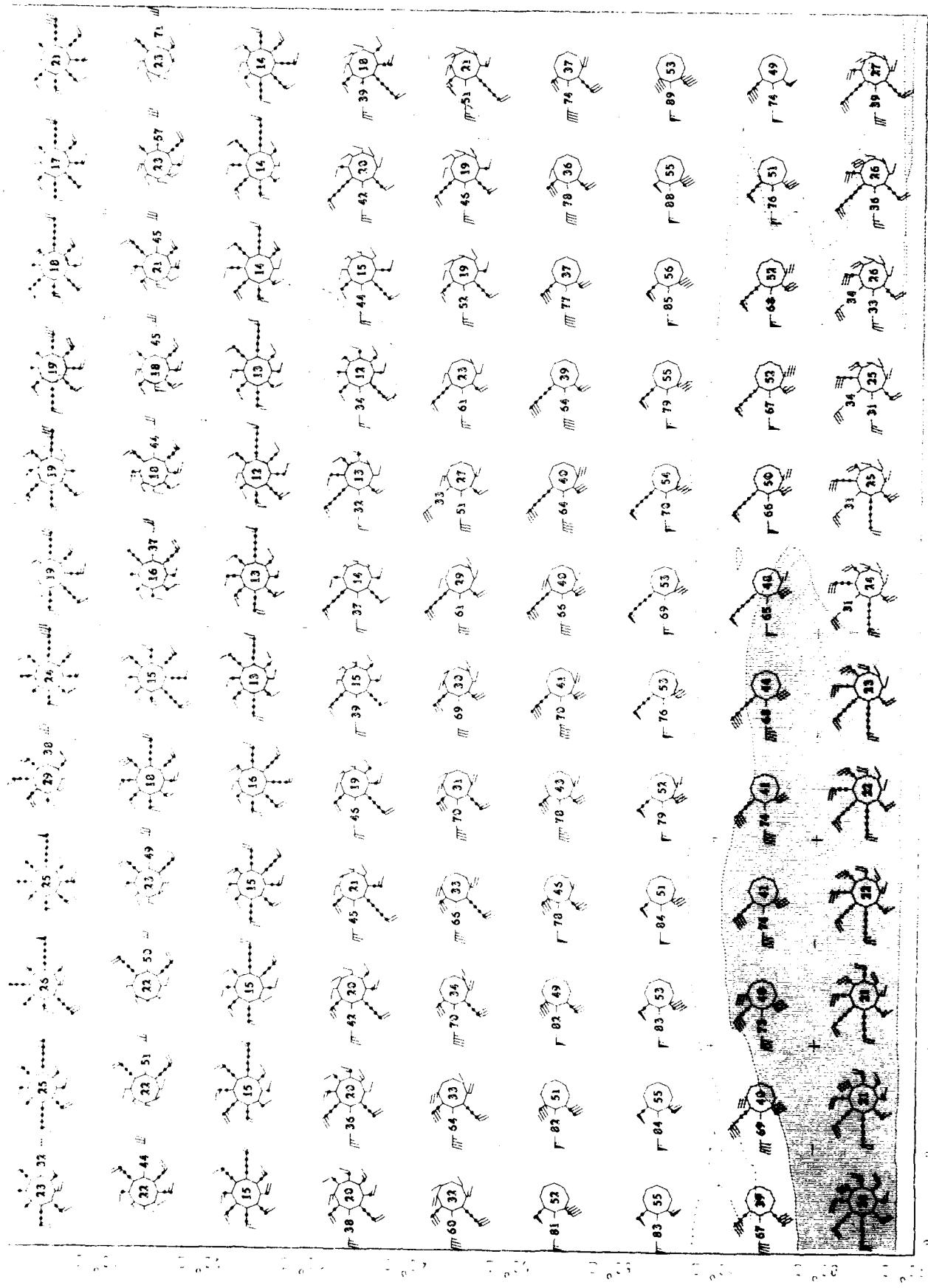


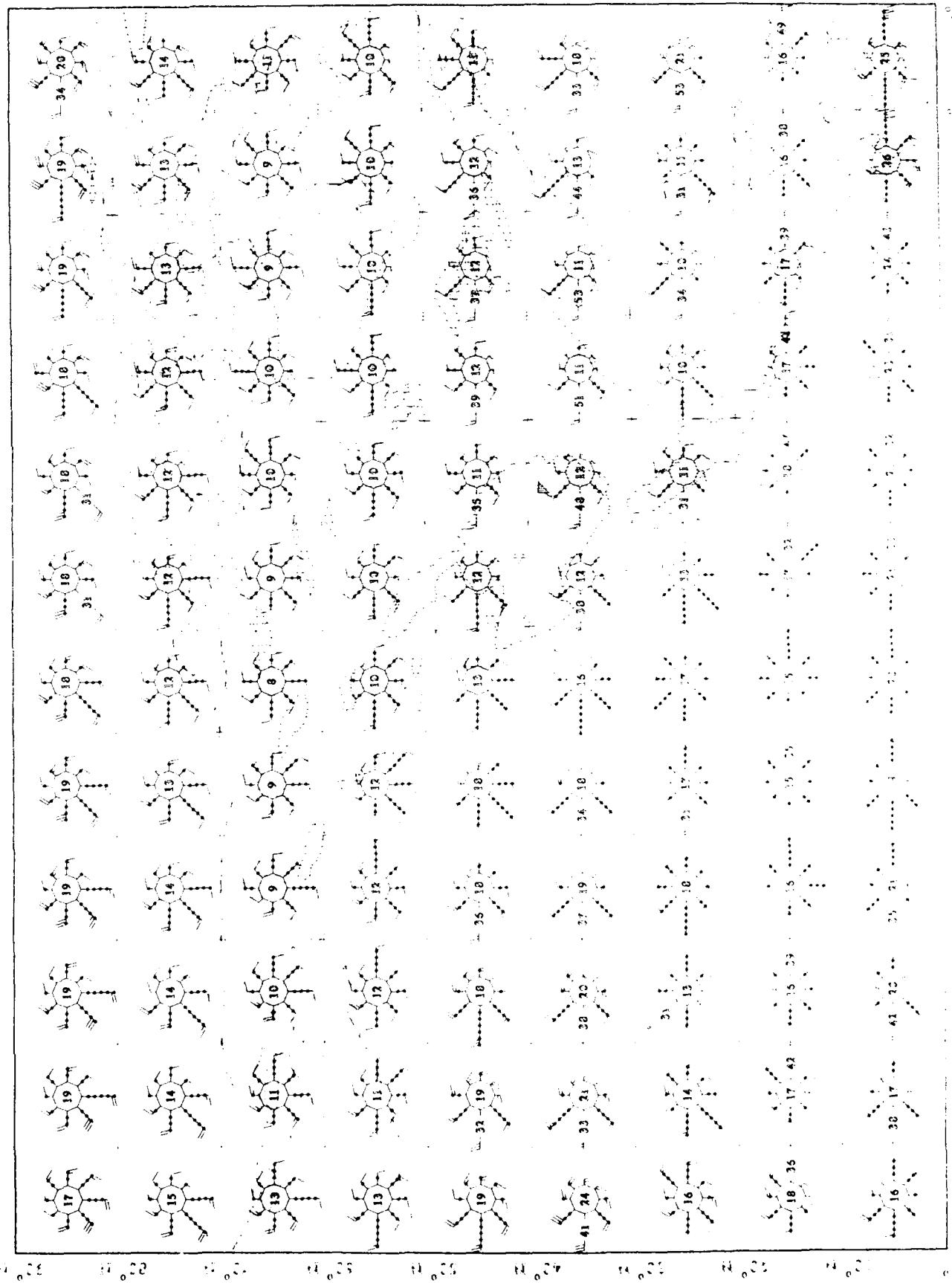


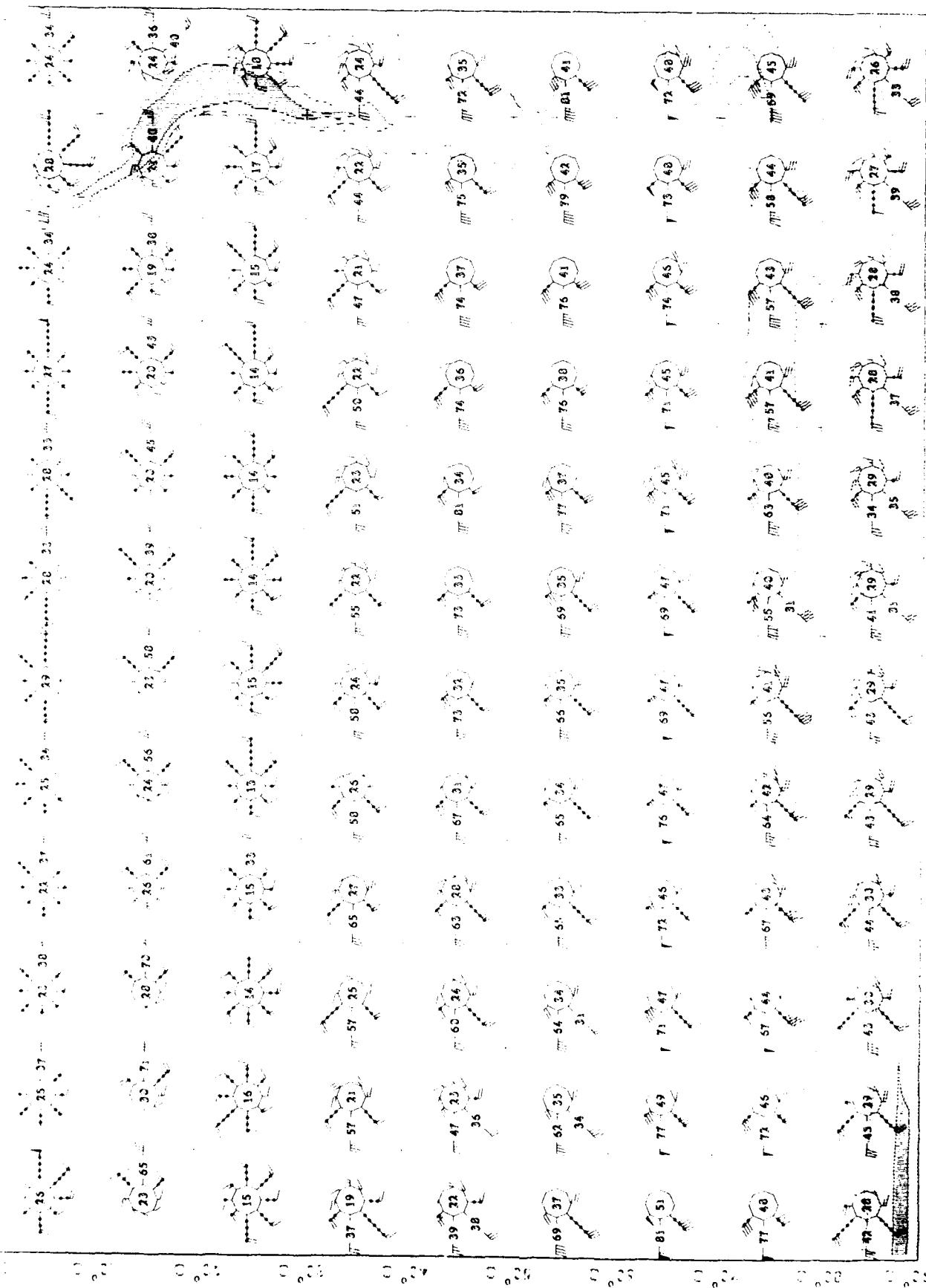








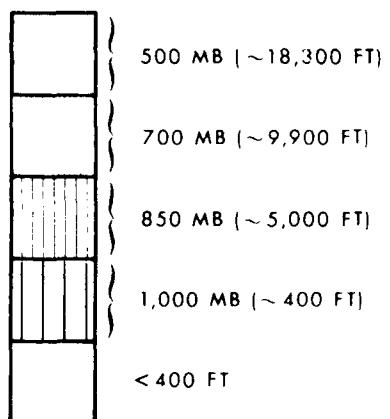




**JET STREAM
(10 LEVELS, 500 TO 30 MB)**

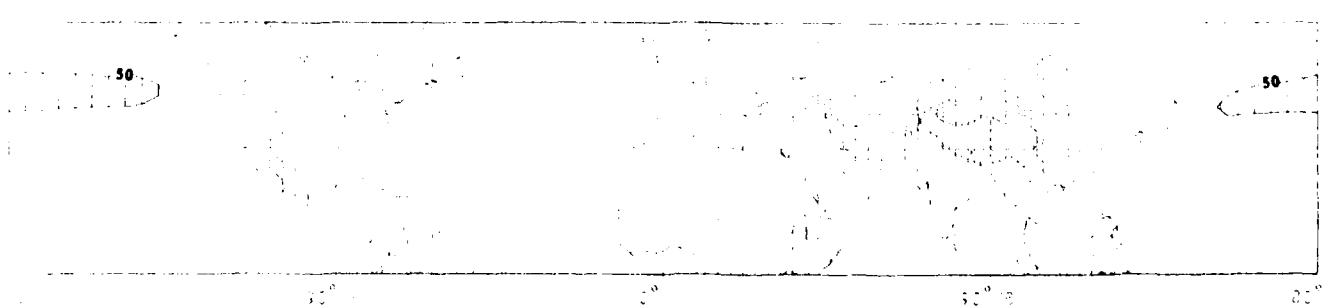
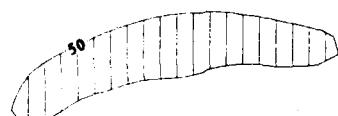
- Contours of mean scalar wind speed in knots
- Minimum mean scalar speed: 50 knots
- Contour interval of mean scalar speed: 25 knots

ELEVATION SCALE



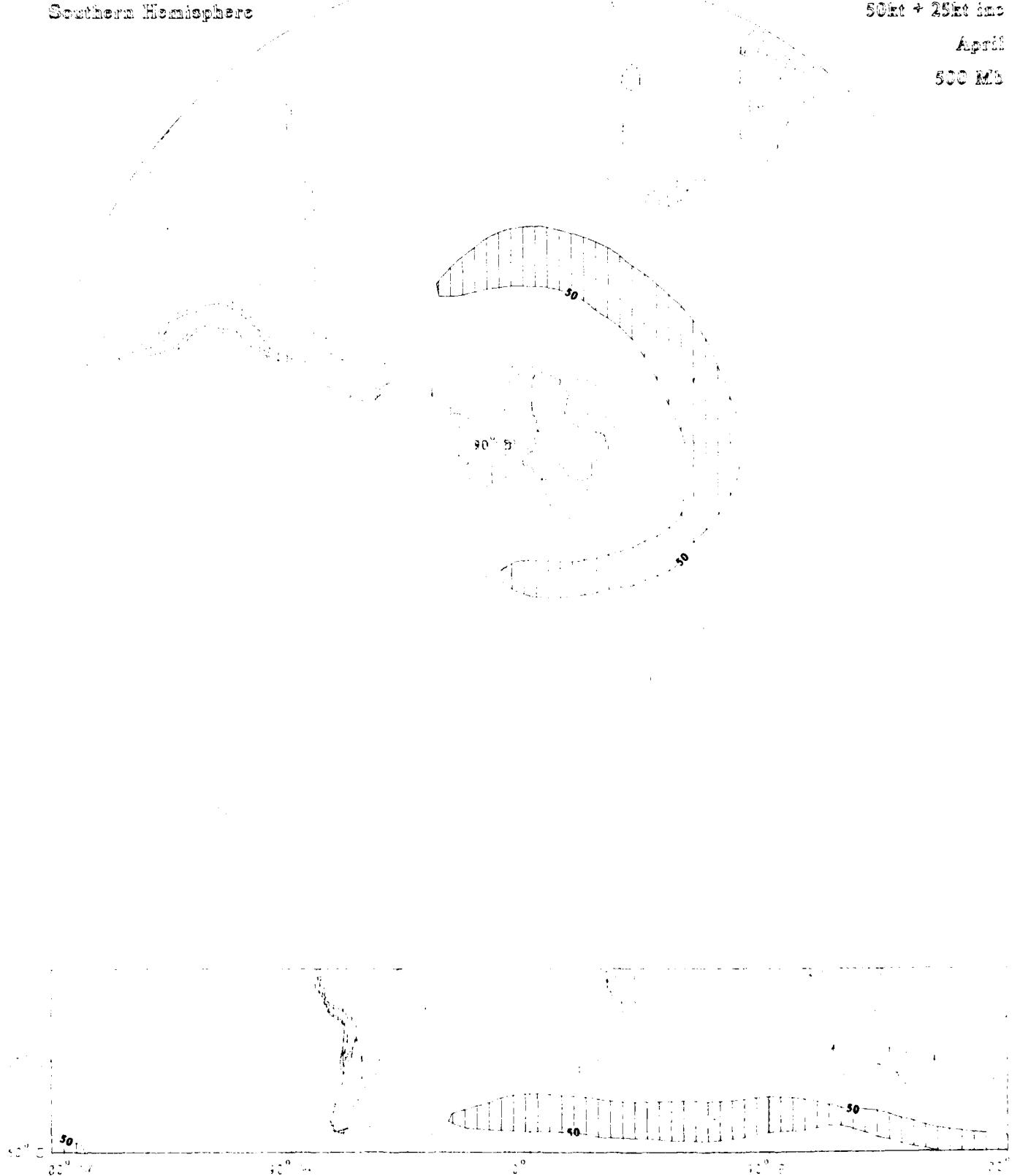
Jet Stream
50kt + 25kt inc
April
500 MB

Upper Air Climatology Northern Hemisphere



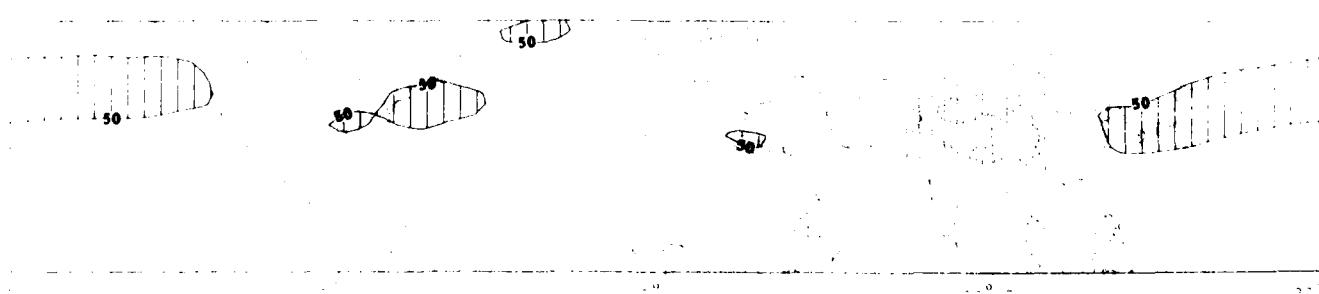
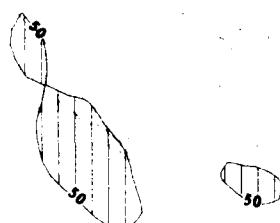
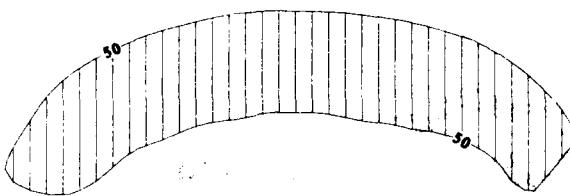
Upper Air Climatology
Southern Hemisphere

Jet Stream
50kt + 25kt inc
April
500 MB



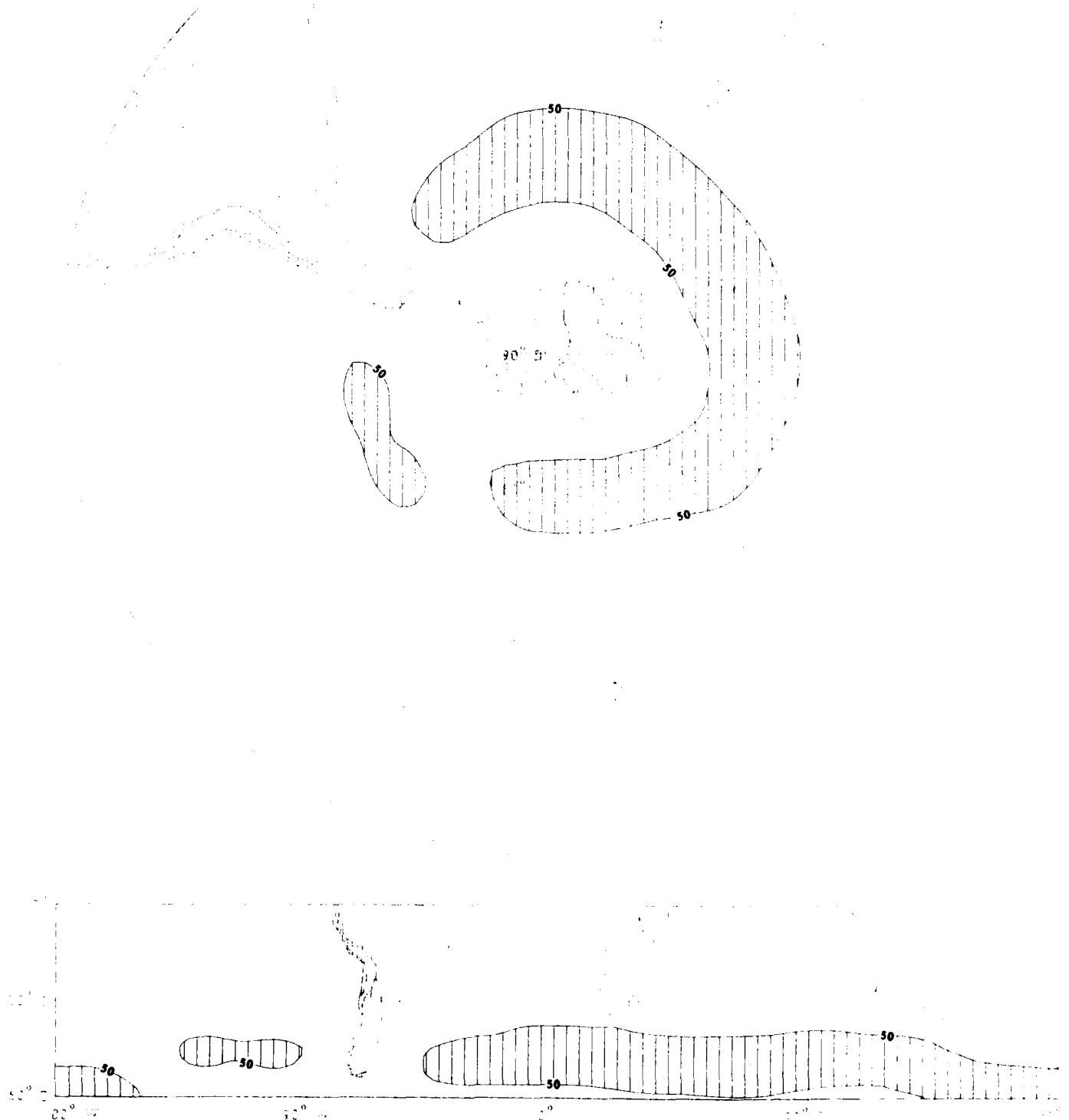
Jet Stream
50kt + 25kt inc
April
400 Mb

Upper Air Climatology
Northern Hemisphere



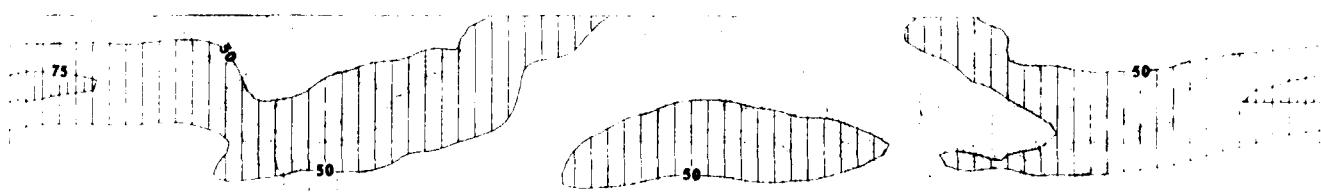
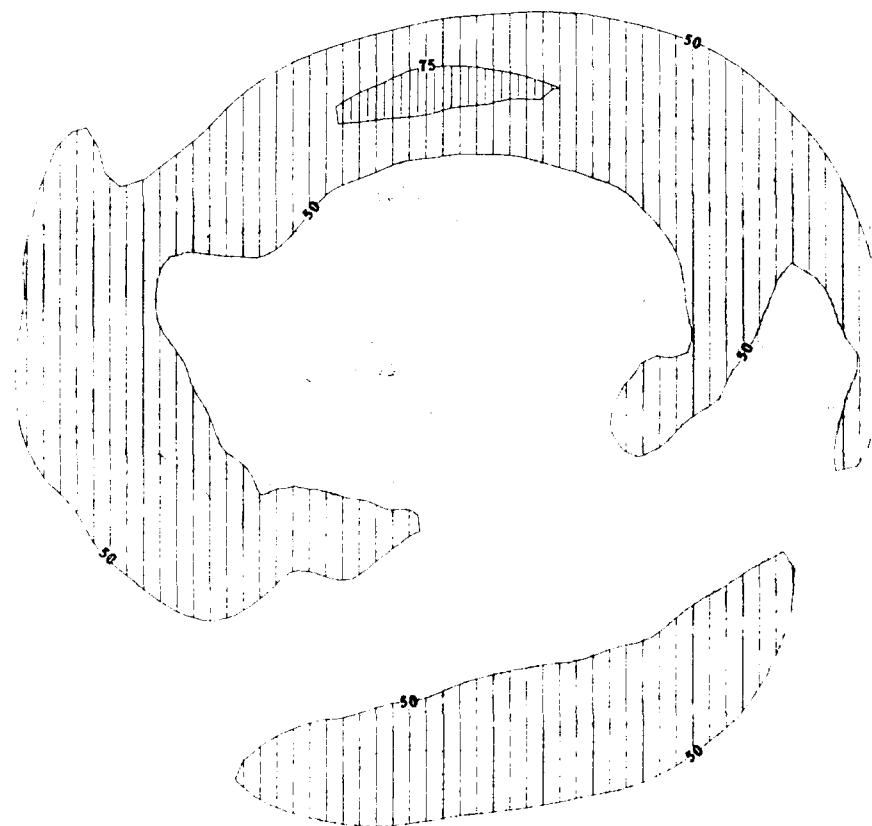
Upper Air Climatology
Southern Hemisphere

Jet Streams
50kt + 25kt inc
April
400 MB



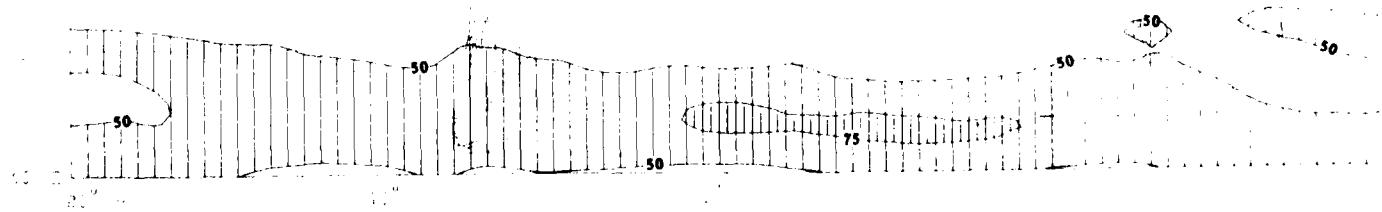
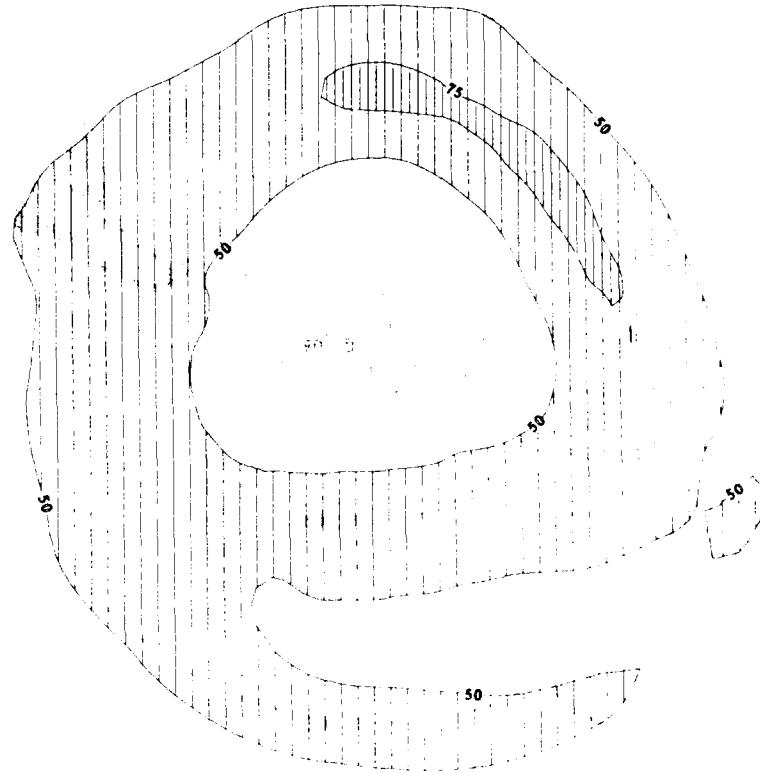
Jet Stream
50kt + 25kt inc
April
300 MB

Upper Air Climatology
Northern Hemisphere



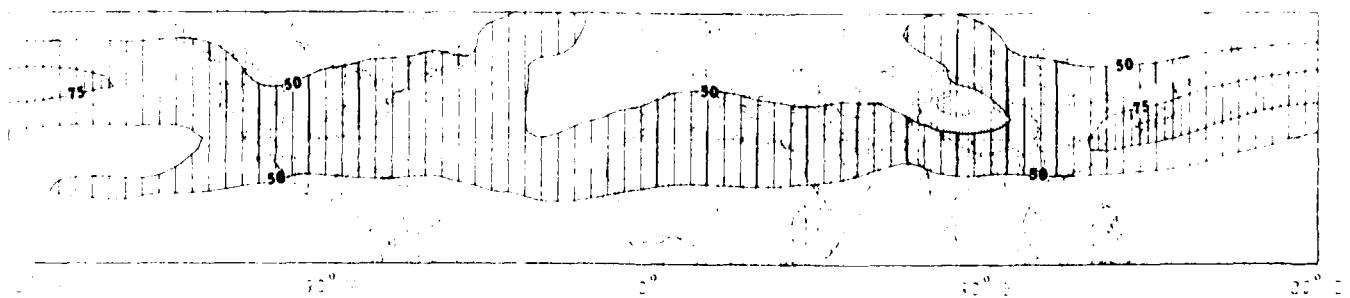
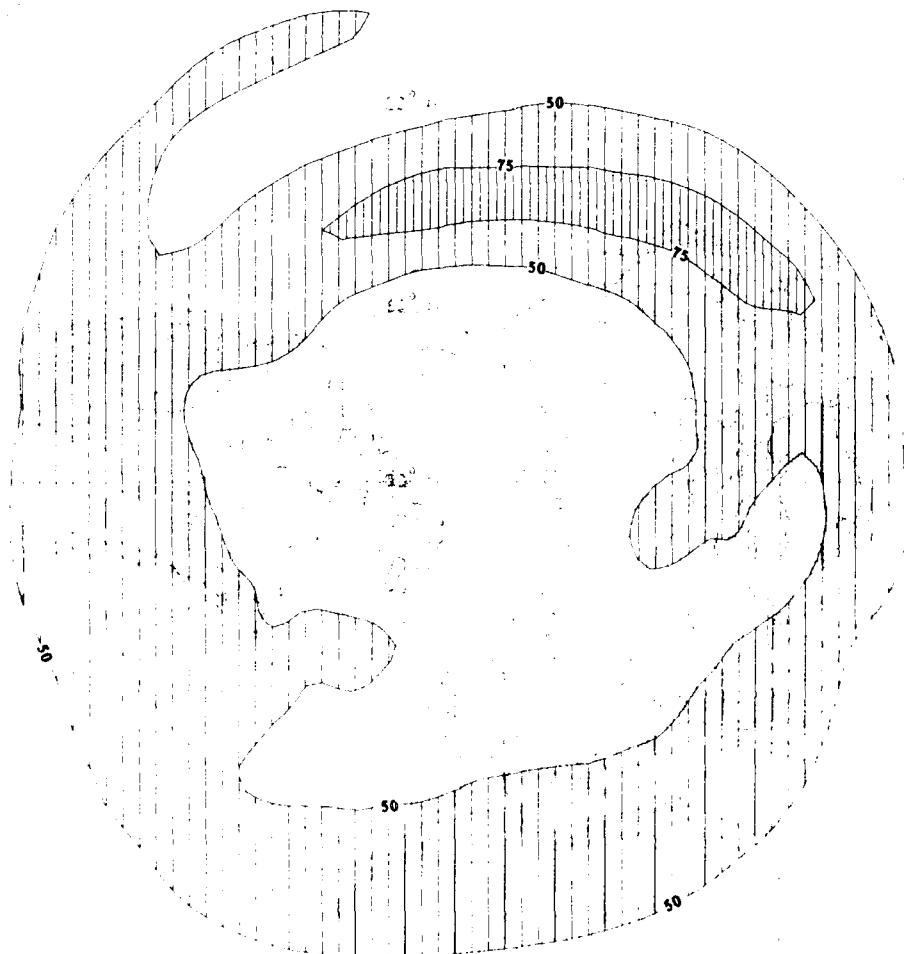
Upper Air Climatology
Southern Hemisphere

Jet Stream
50kt + 25kt inc
Aptd
300 MB



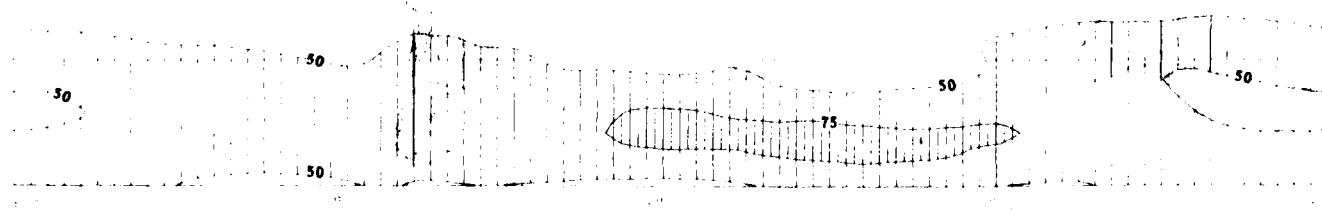
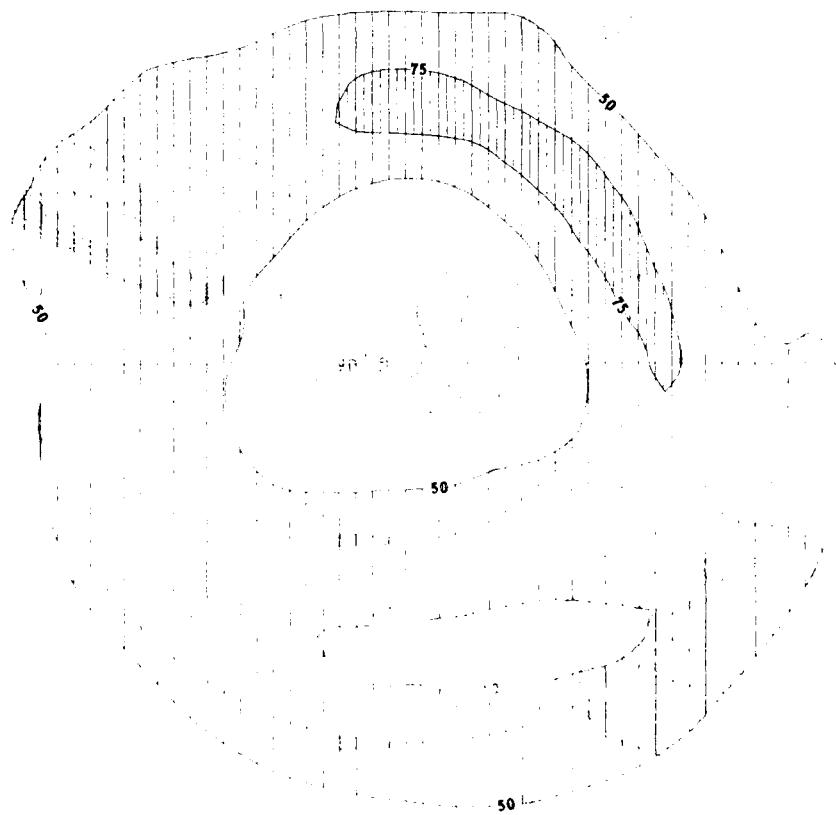
Jet Stream
50kt + 25kt inc
April
250 Mb

Upper Air Climatology
Northern Hemisphere



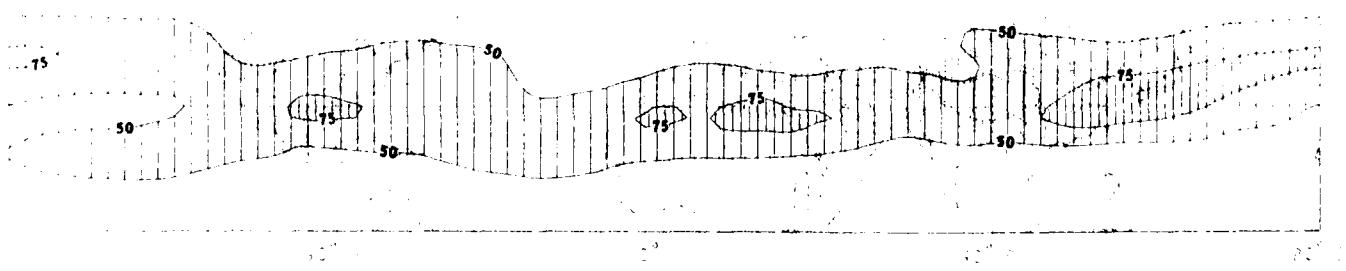
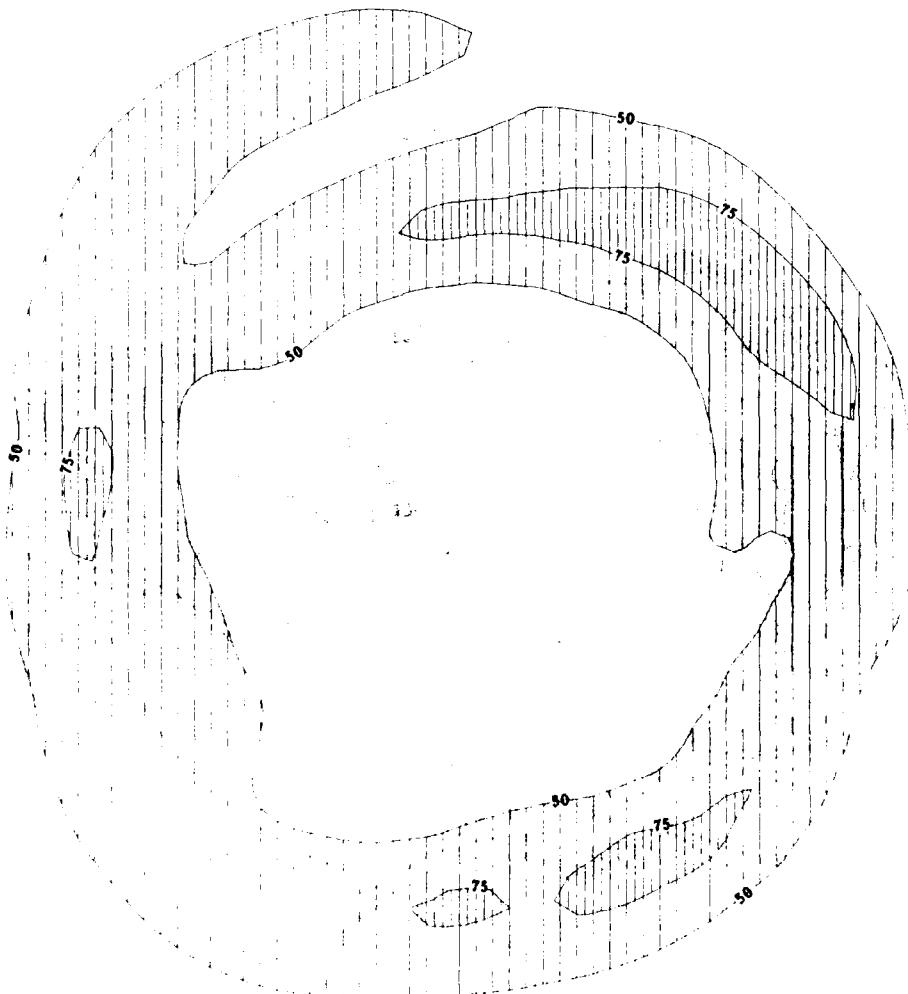
Upper Air Climatology
Southern Hemisphere

Jet Stream
50kt + 25kt inc
April
250 Mb



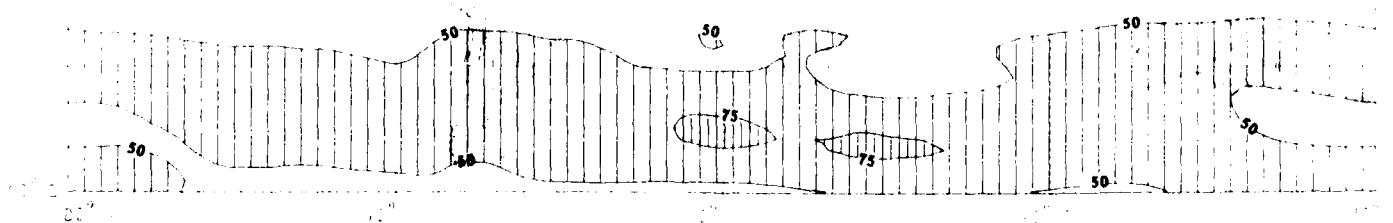
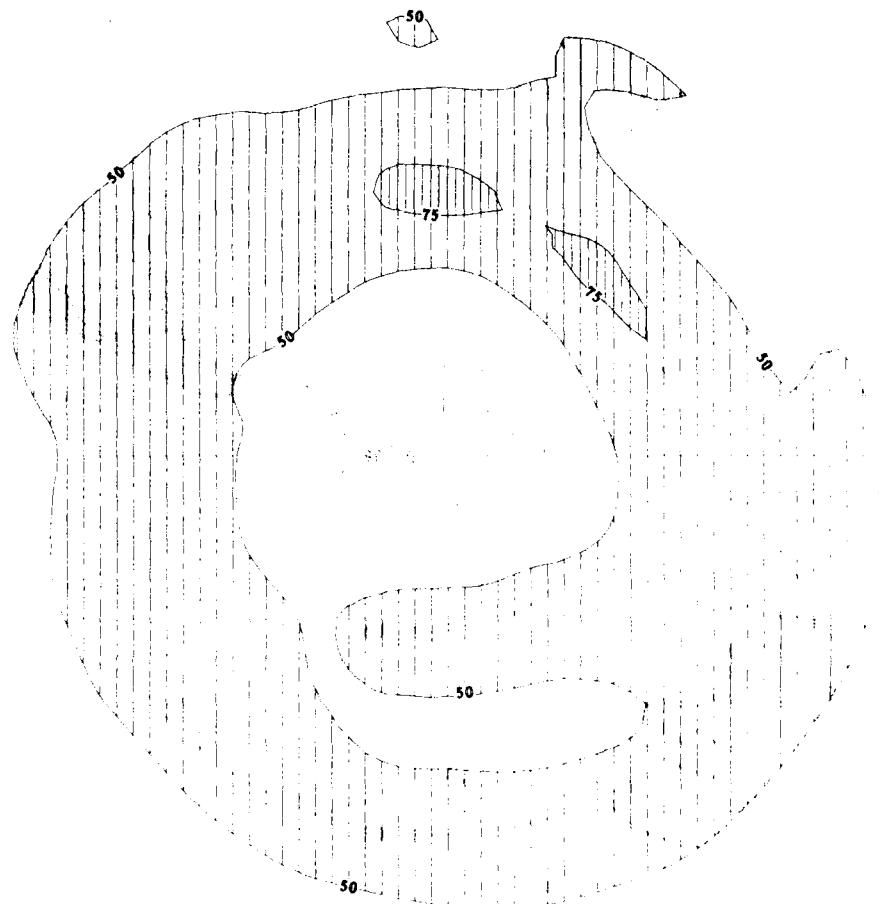
Jet Stream
50kt + 25kt inc
April
201 MB

Upper Air Climatology
Northern Hemisphere



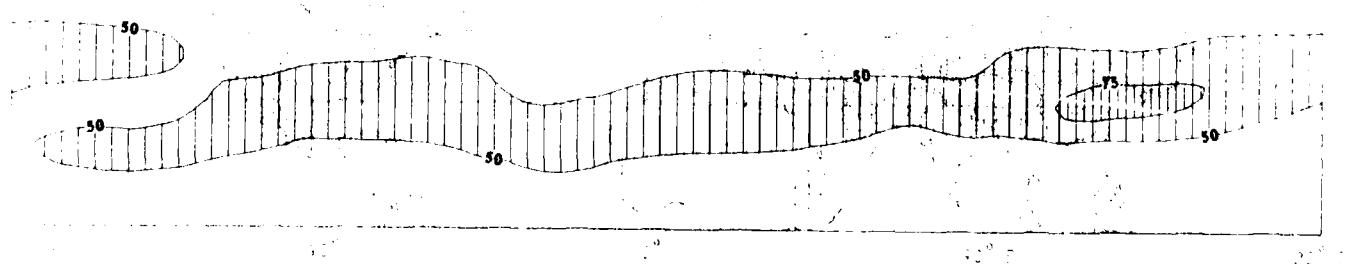
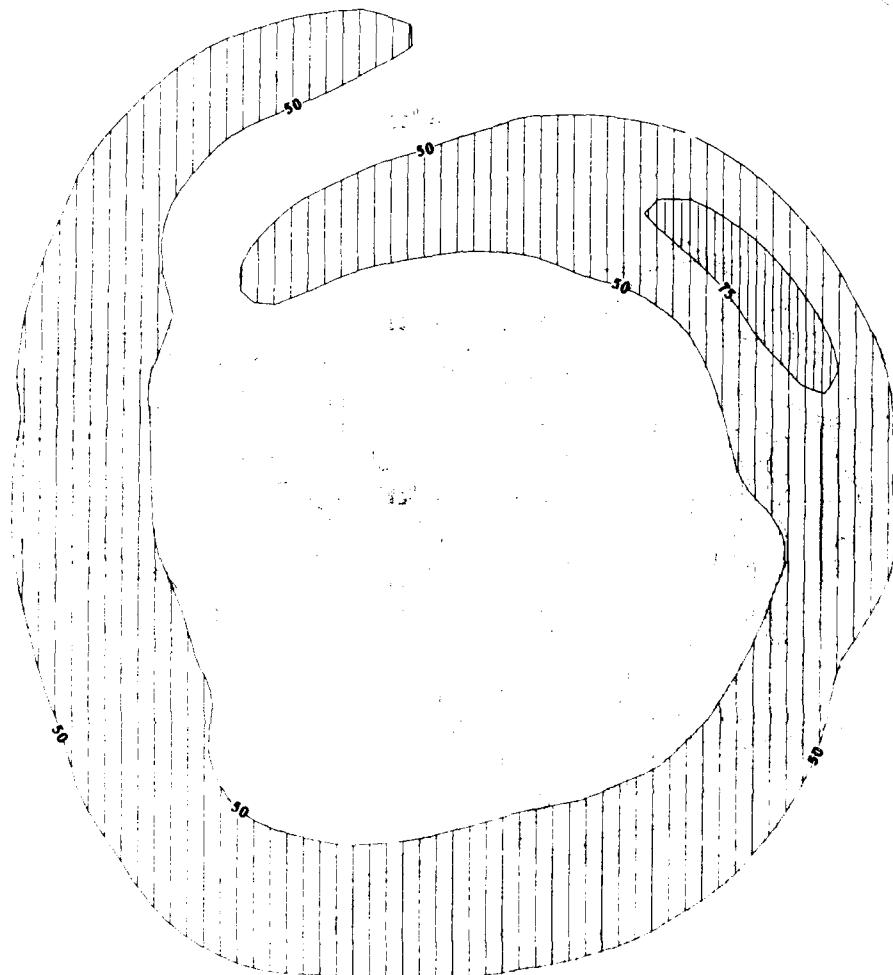
Upper Air Climatology
Southern Hemisphere

Jet Stream
50kt + 25kt inc
April
200 MB



Jet Stream
50kt + 25kt inc
April
150 Mb

Upper Air Climatology
Northern Hemisphere



Upper Air Climatology

Southern Hemisphere

Jet Circuits

S Jet + N Jet and

Aug 55

150 MHz



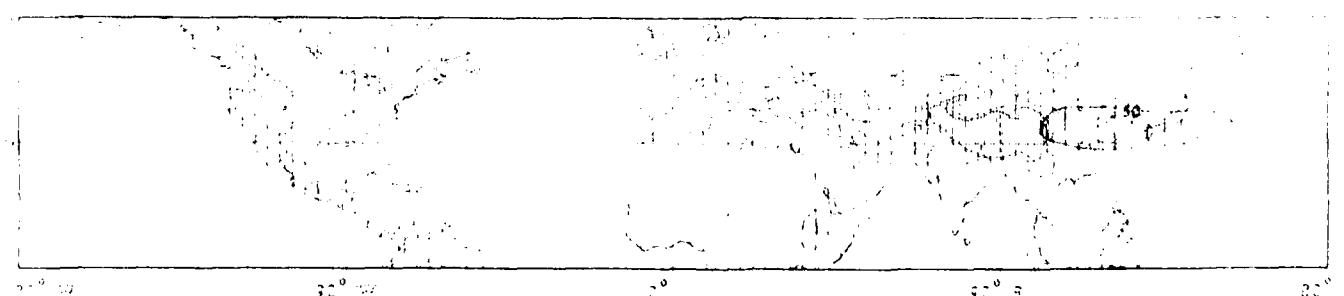
10 August

High & low tide

Sea level - 100 ft.

Mean sea level

100 ft.

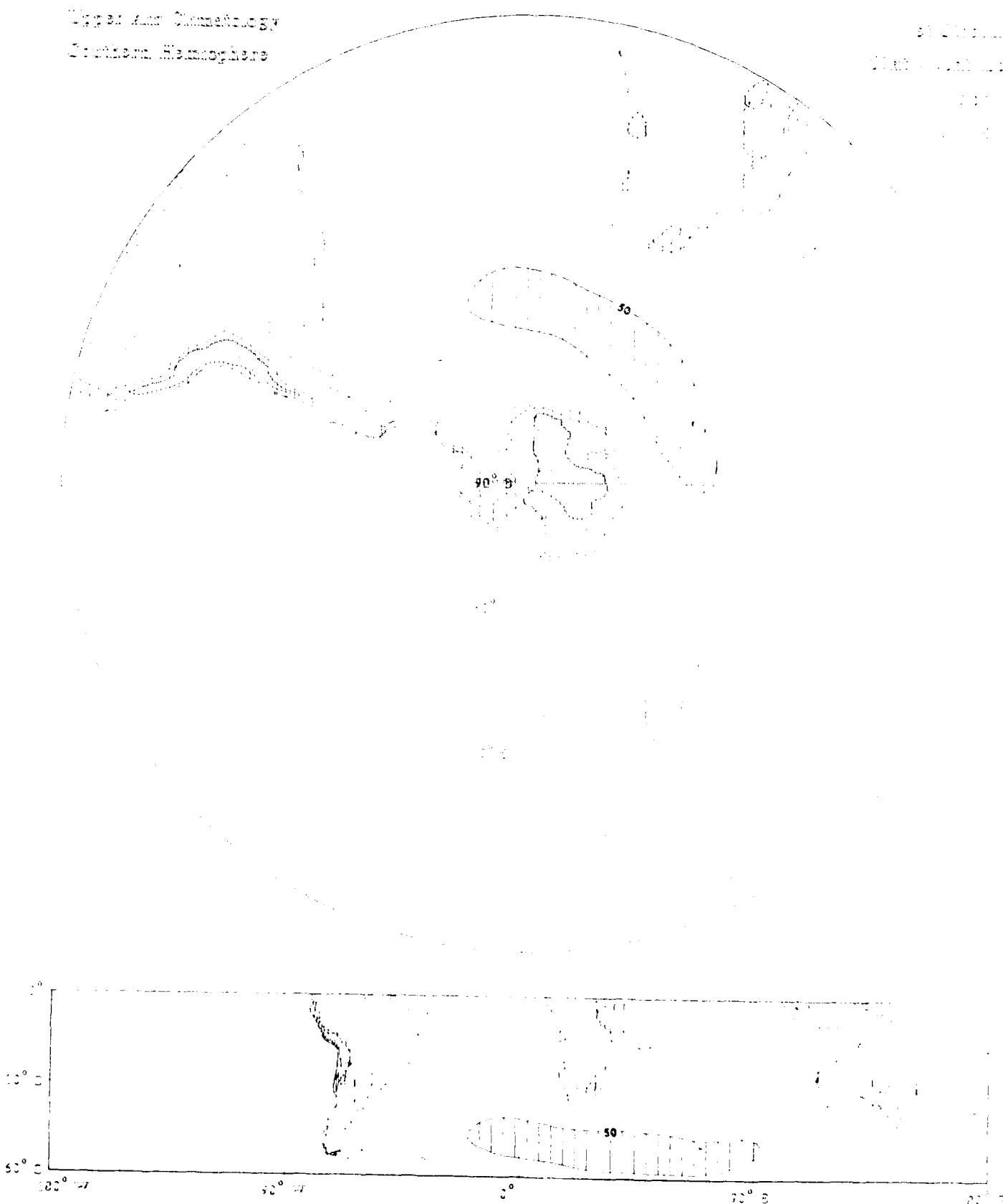


Upper Air Climatology

Northern Hemisphere

500 mb

Temperature



Jet Stream

Cloud + Cloud Ave

Avg

200 mb

Upper Air Climatology

Northern Hemisphere

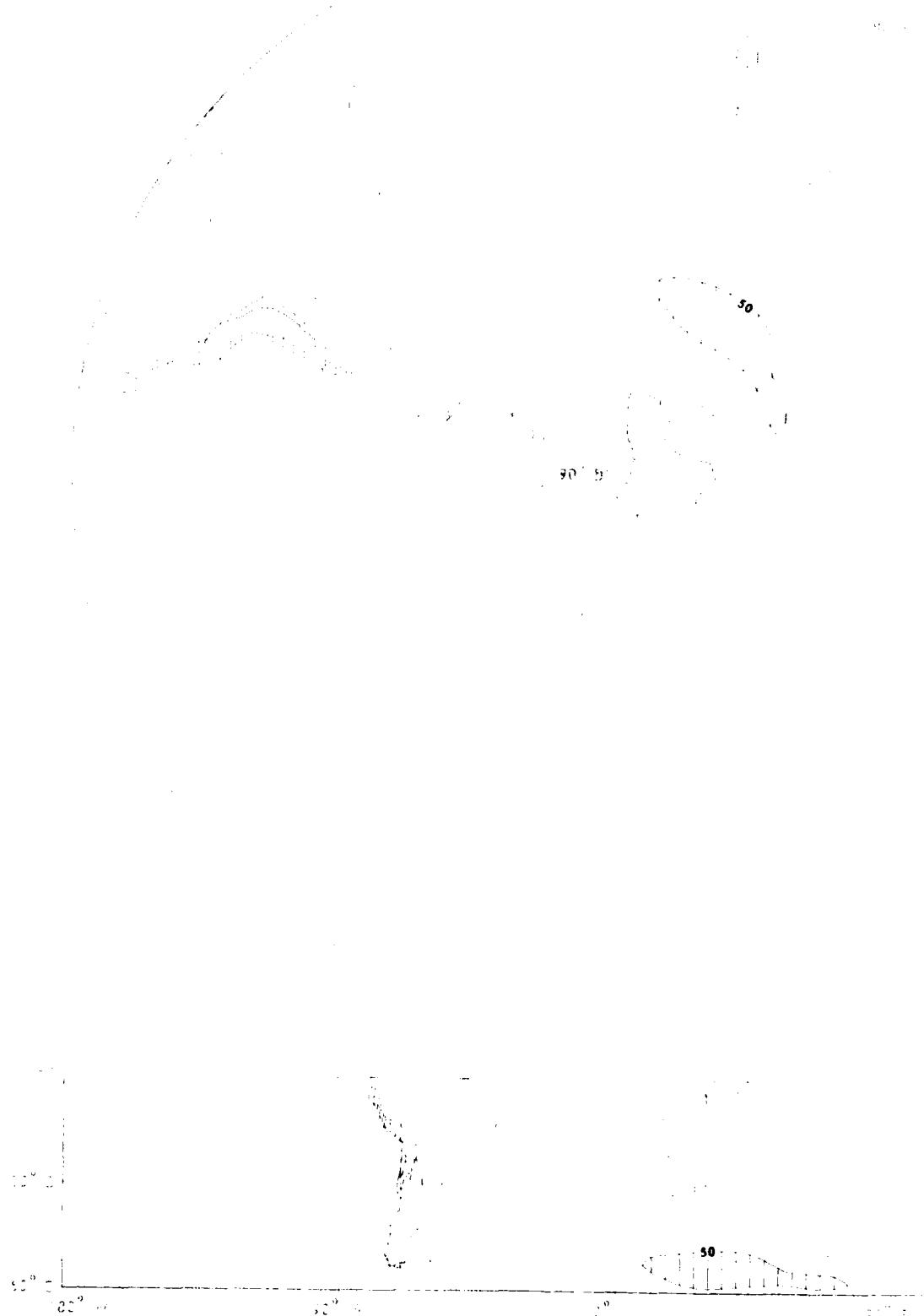
10³ mb

Wind < 50 kt

Upper Air Climatology
Northern Hemisphere

Jet Stream
500 mb 200 mb

Altitude
200 mb



Jet Stream

50kt + 25kt inc

April

50 mb

Upper Air Climatology

Northern Hemisphere

12° N

15° S

Wind < 50 KT

Wind > 50 KT

Wind > 75 KT

Wind > 100 KT

Wind > 125 KT

Wind > 150 KT

Wind > 175 KT

Wind > 200 KT

12°

15°

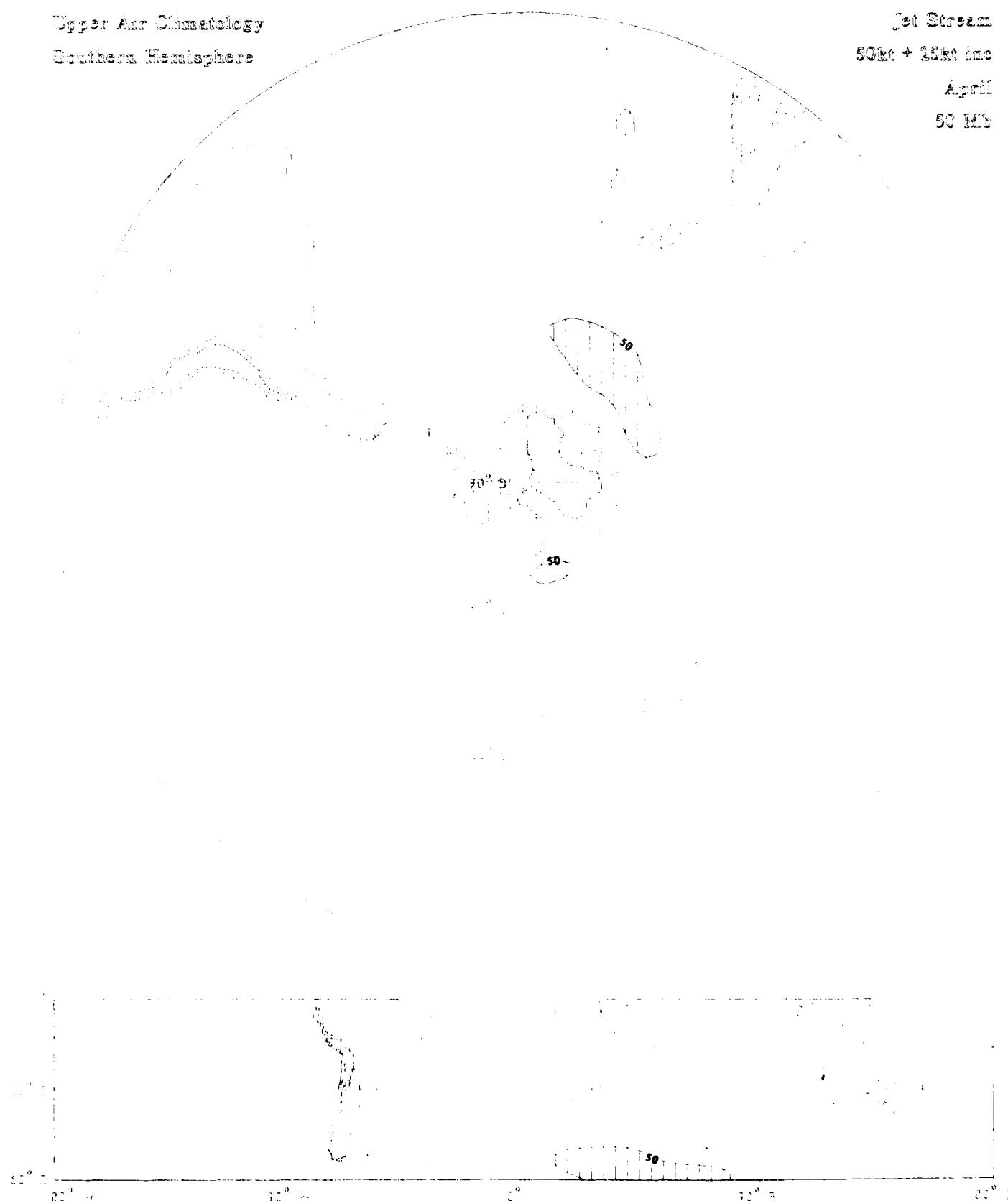
0°

30° S

30° N

Upper Air Climatology
Southern Hemisphere

Jet Stream
50kt + 25kt inc
April
50 MB



Jet Stream
50kt + 25kt inc
April
90 Mb

Upper Air Climatology
Northern Hemisphere

10° N

20° N

30° N

40° N

50° N

60° N

70° N

80° N

90° N

10° S

20° S

30° S

40° S

50° S

60° S

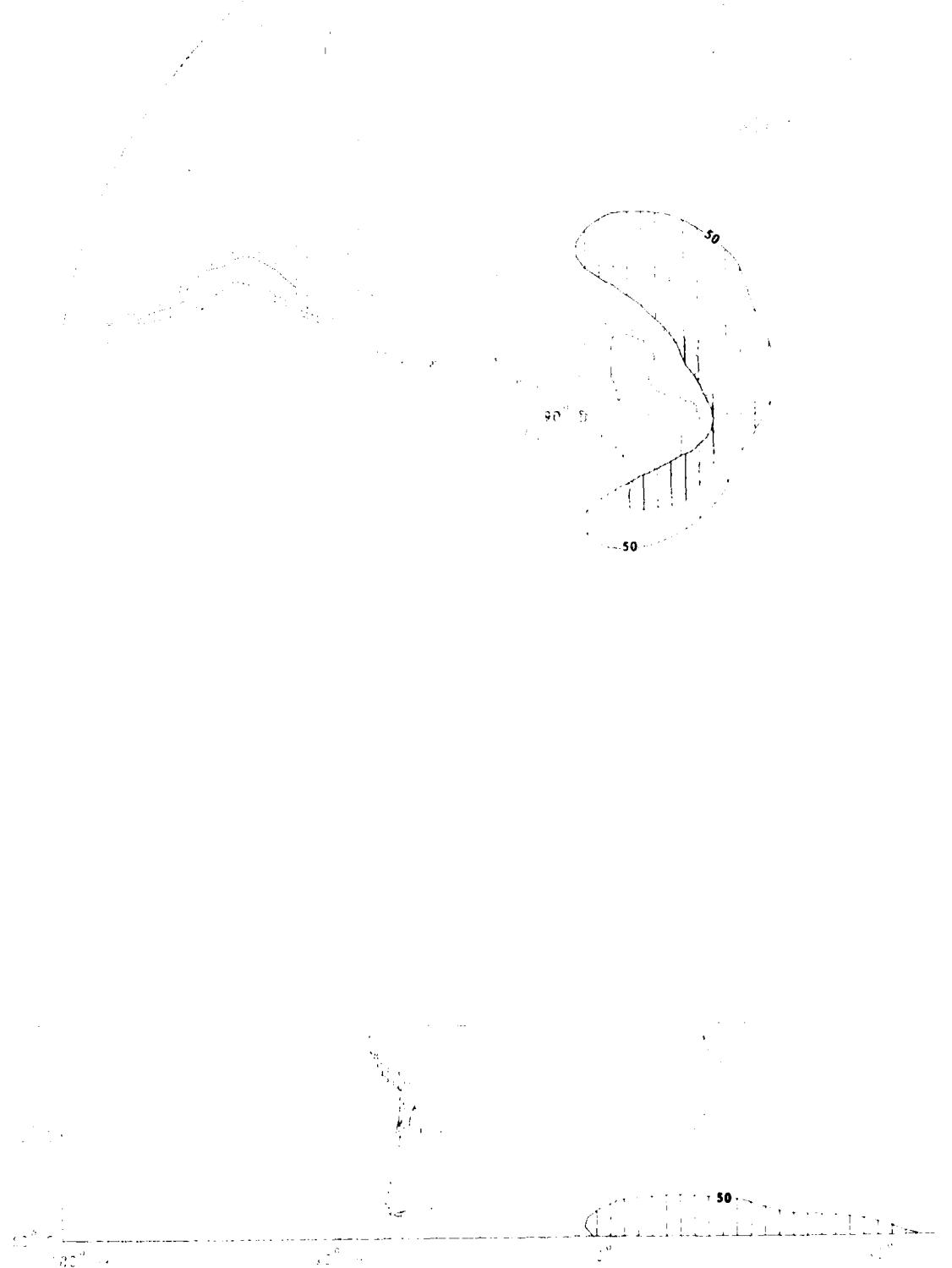
70° S

80° S

90° S

Upper Air Climatology
Southern Hemisphere

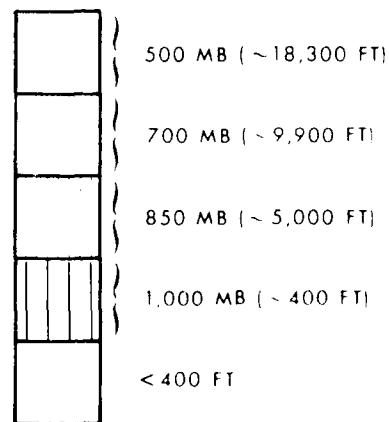
Jet Stream
Slope & Zonal wind
Ageost.
1000 mb



TEMPERATURE
(13 LEVELS, 1000 TO 30 MB)

- Contours of mean temperature (solid and dashed lines) in °C; solids labeled, dashed intermediates unlabeled
- Temperature labeled interval: 5°C
- Contours of standard deviation of temperature (dotted lines) in °C
- Standard deviation of temperature labeled interval: 2.5°C
- Contours blanked for geographic areas with elevations exceeding specified geopotential heights

ELEVATION SCALE



W363 W363 W363 W363 (2)

Digitized by Google

MATERIALS AND METHODS



Type B Air Climatology

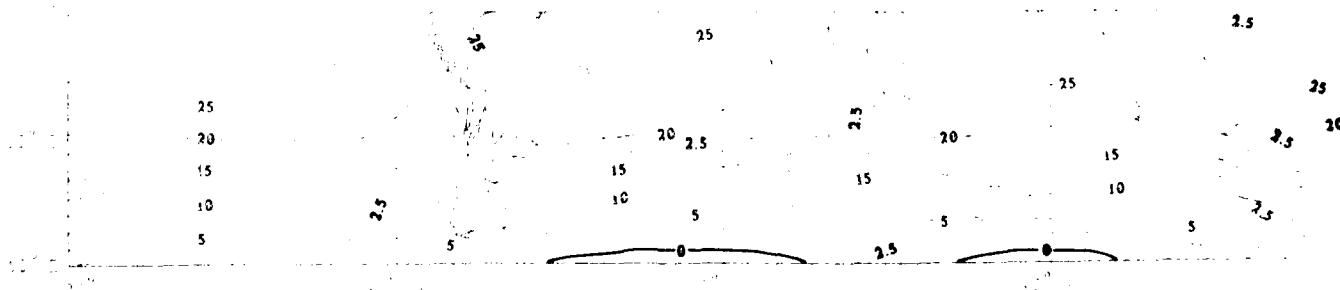
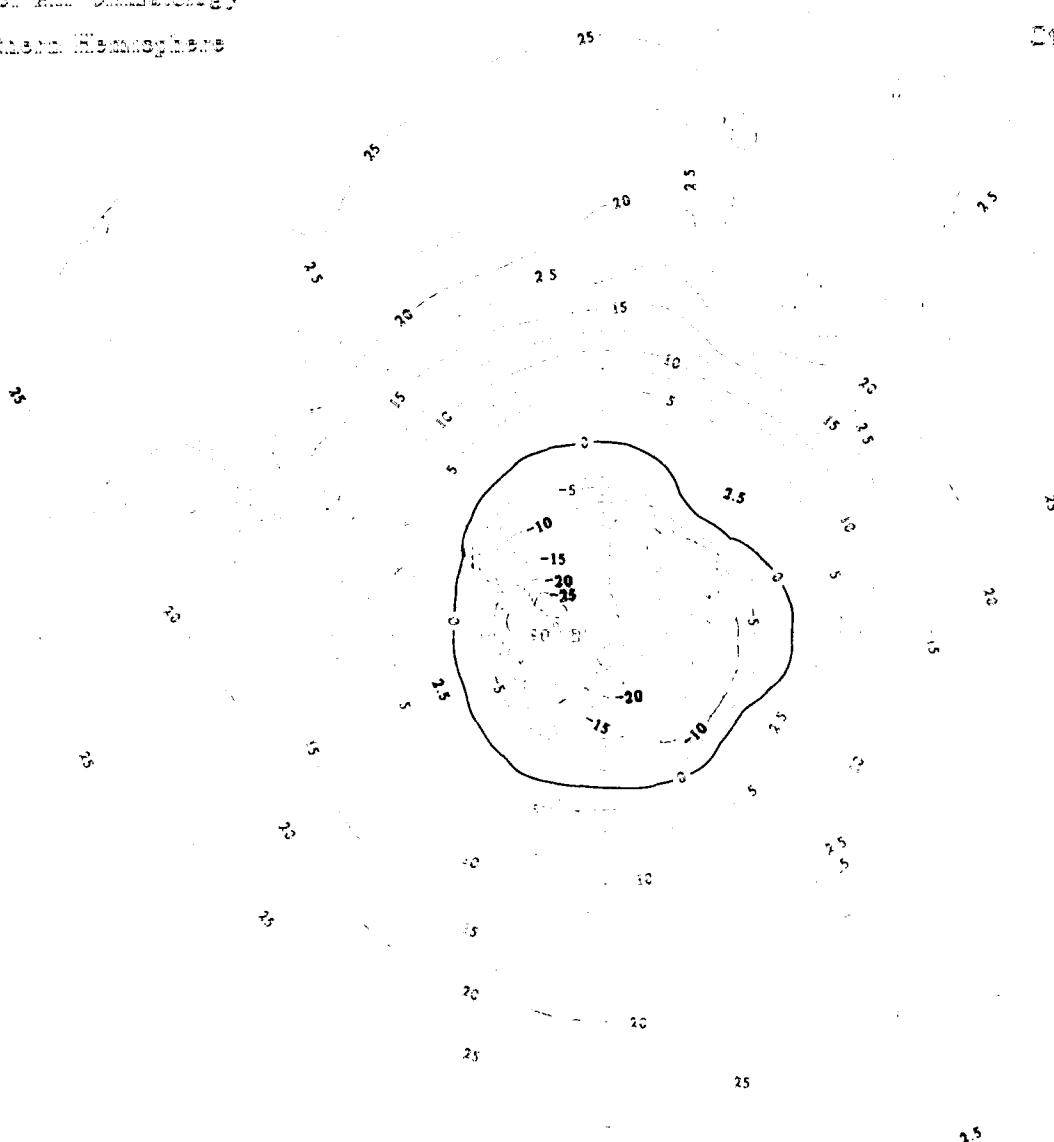
Ground Temperature

Mean Temperature (°C)

Std Dev (Dotted)

Avg

Max Min



Mean Temperature ($^{\circ}$)

Std Dev (Corrected)

8.5 M

20.1 M

Upper Air Climatology

Northern Hemisphere

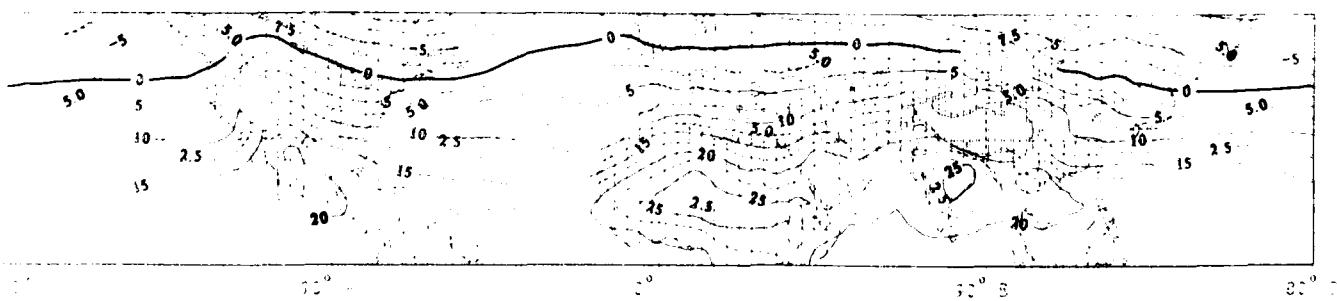
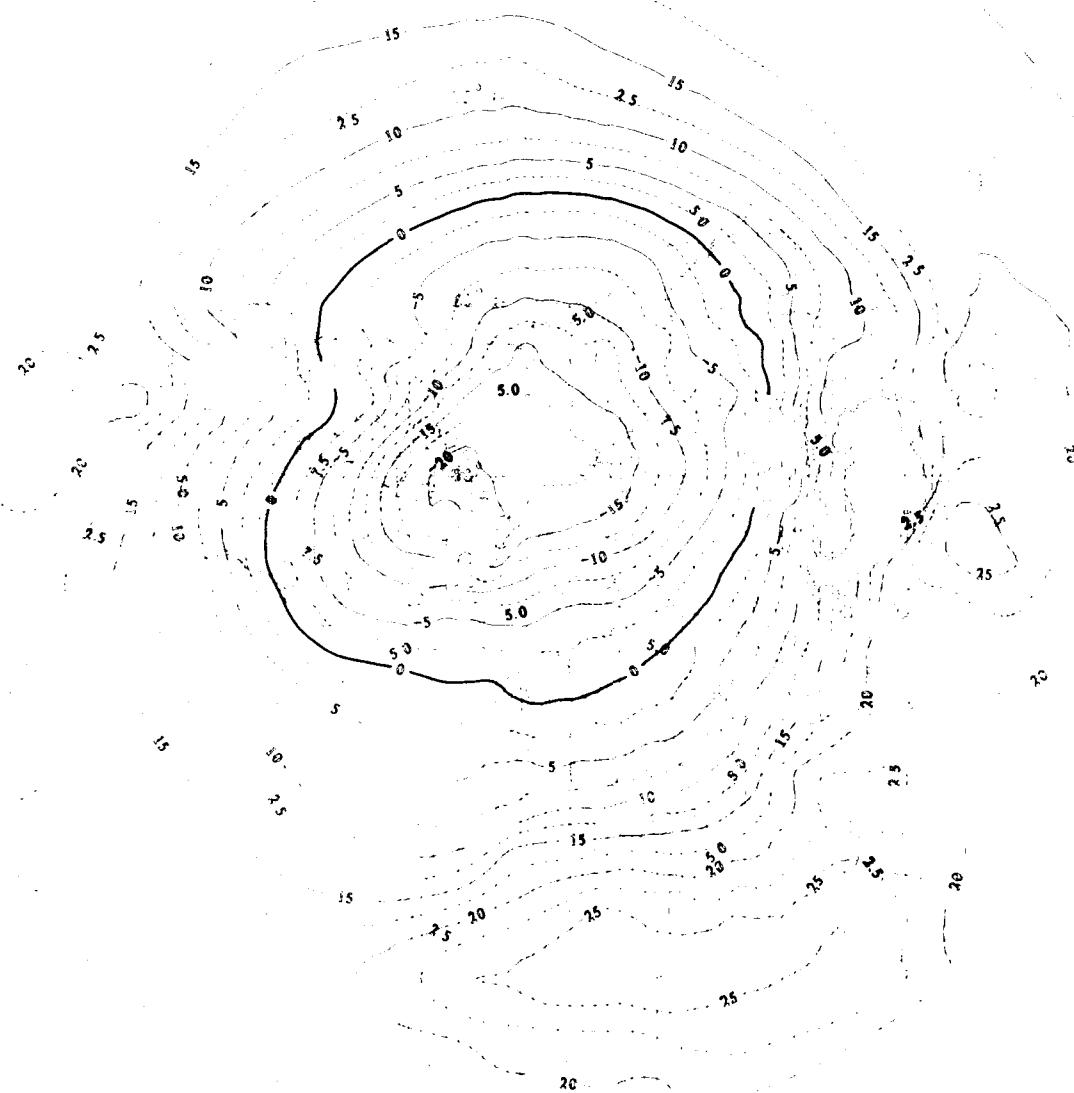
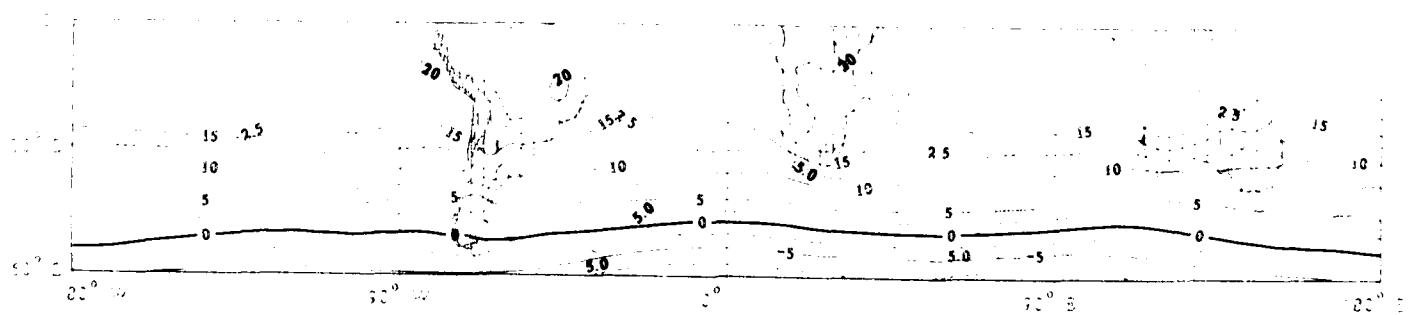
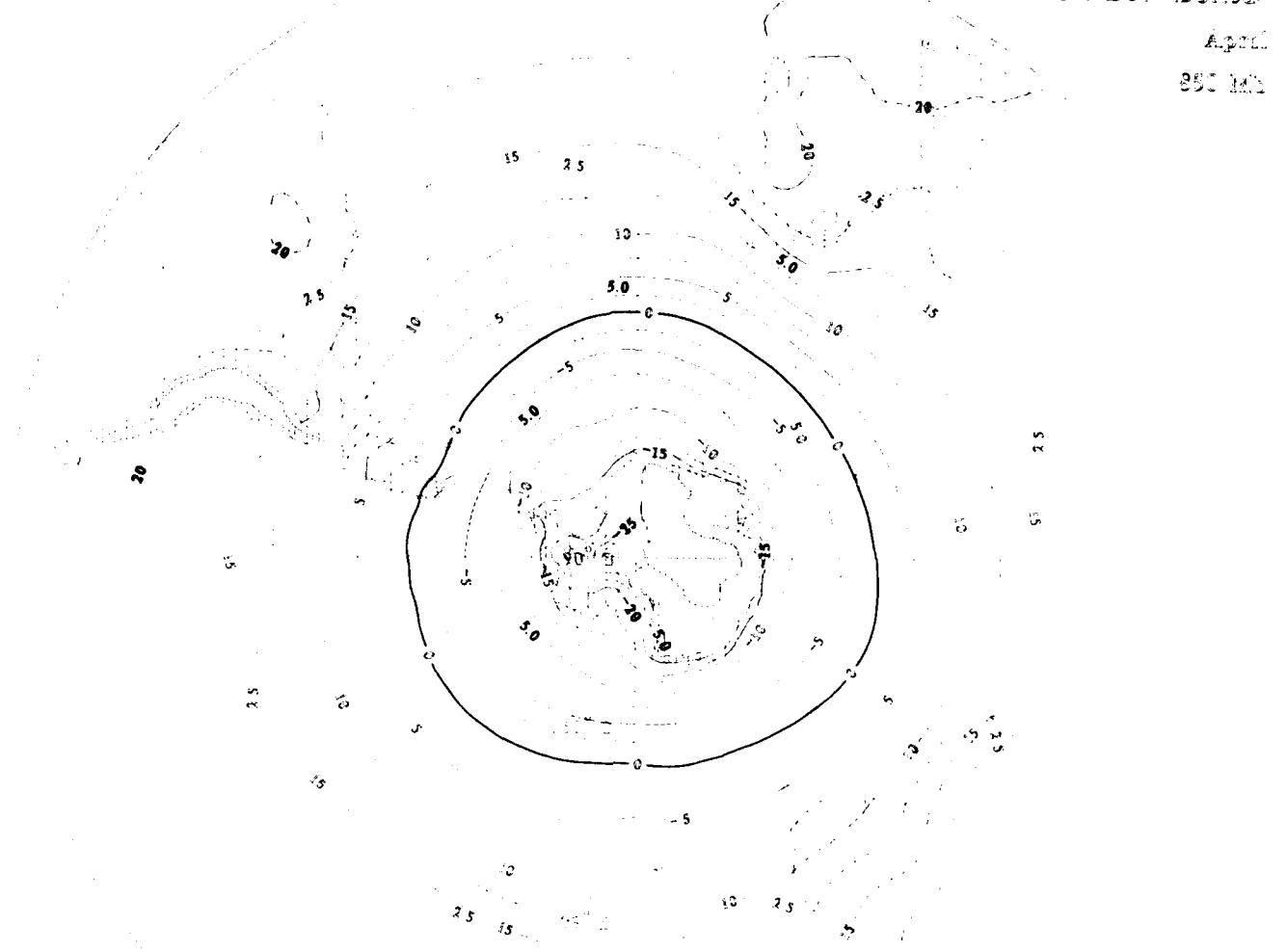


Fig. 81. Areal Climatology
Northern Hemisphere

Mean Temperature (°)
Std Dev (Cotted)
April
850 mb



Mean Temperature ($^{\circ}$ C)

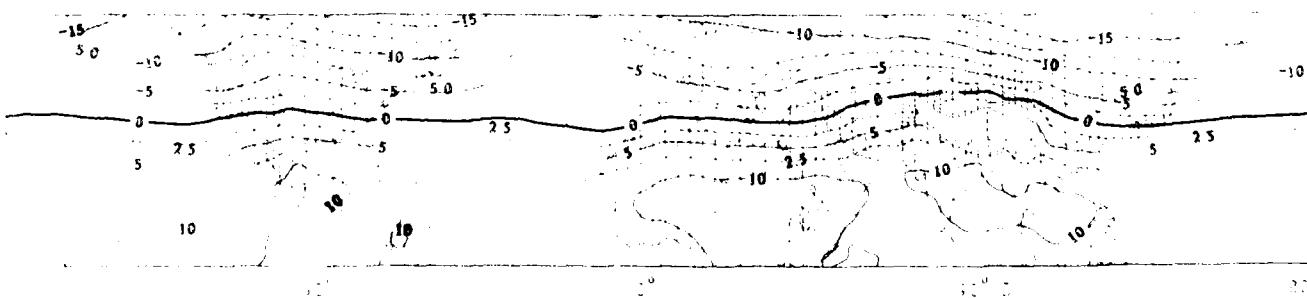
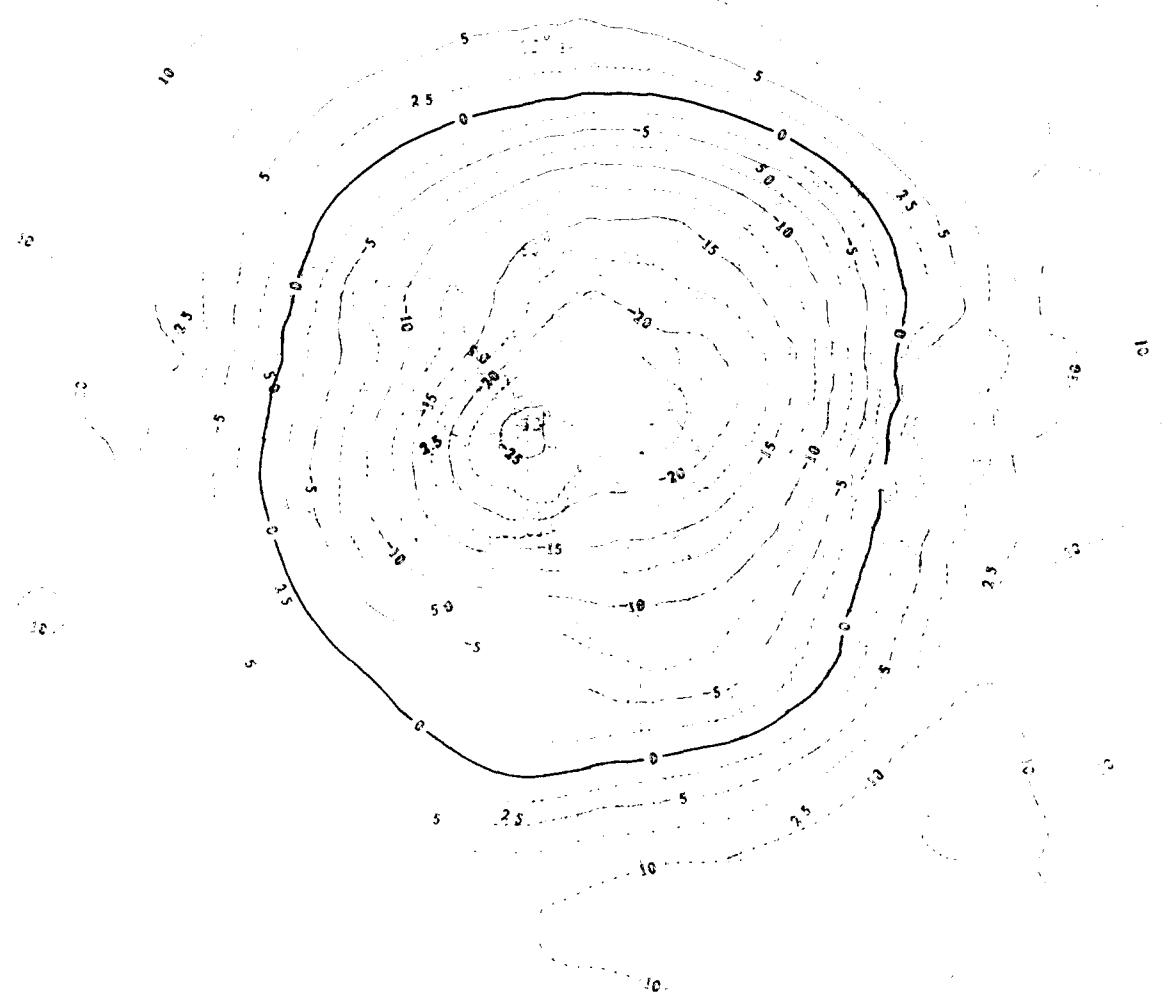
Std Dev < Dotted >

April

700 MB

Upper Air Climatology

Northern Hemisphere



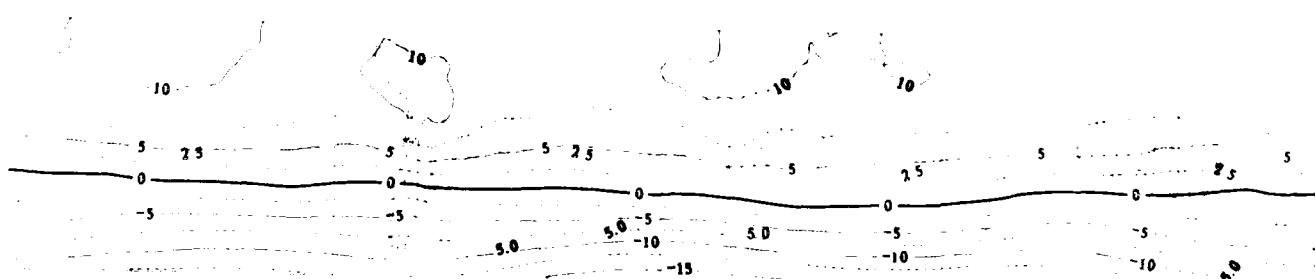
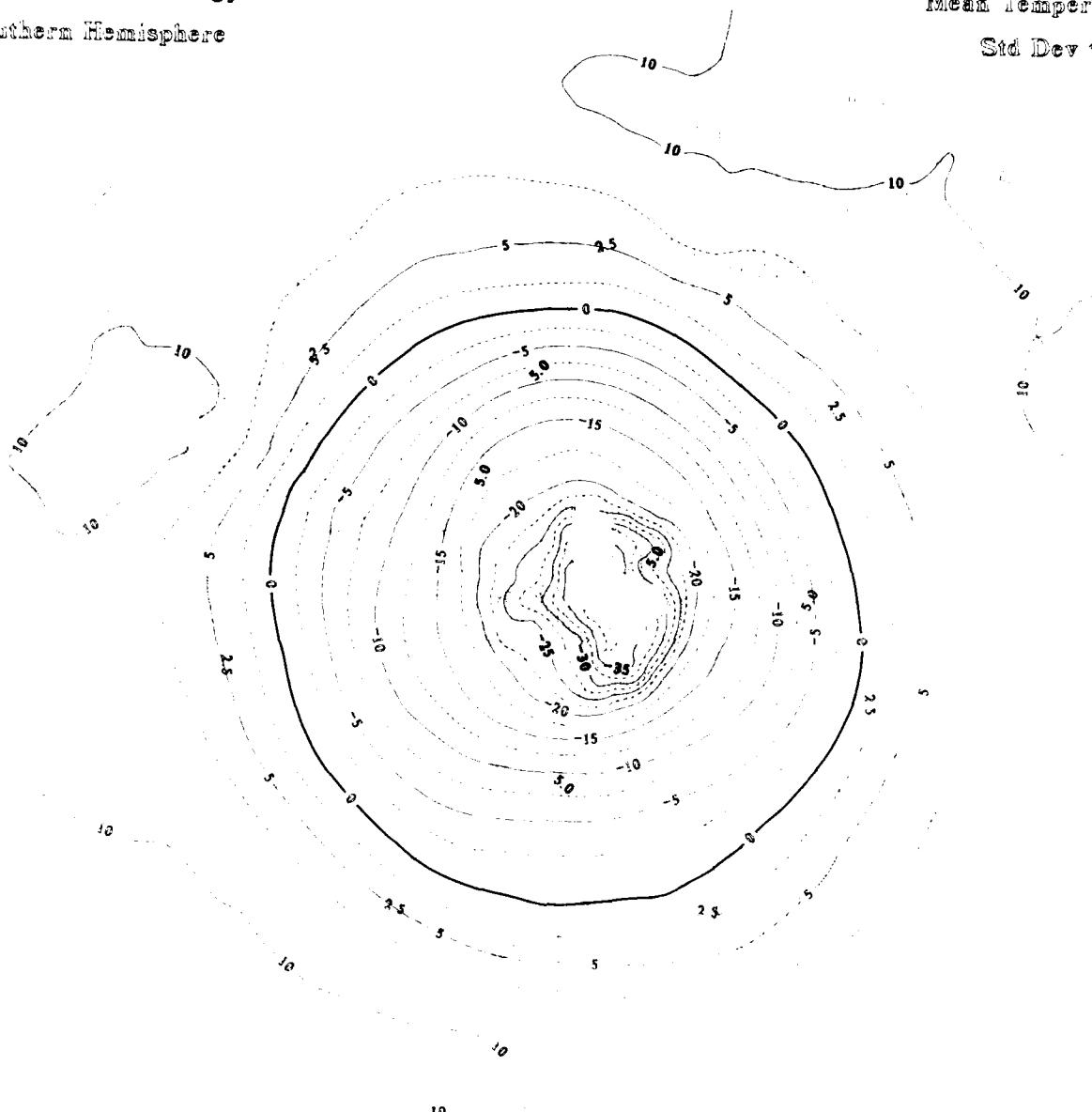
Upper Air Climatology
Southern Hemisphere

Mean Temperature (°C)

Std Dev < Dotted >

April

700 MB



Mean Temperature (°C)

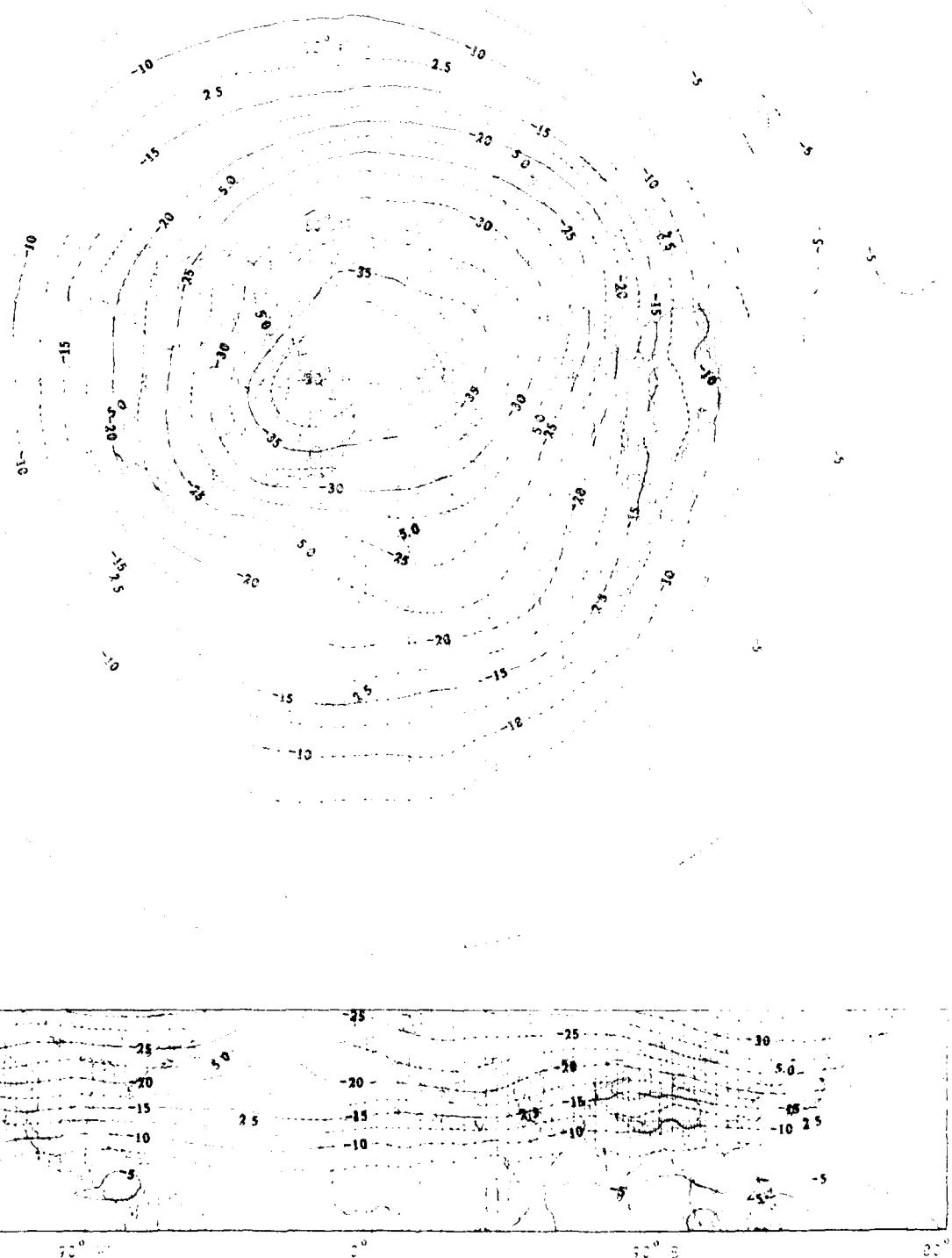
Std Dev (Dotted)

April

500 MB

Upper Air Climatology

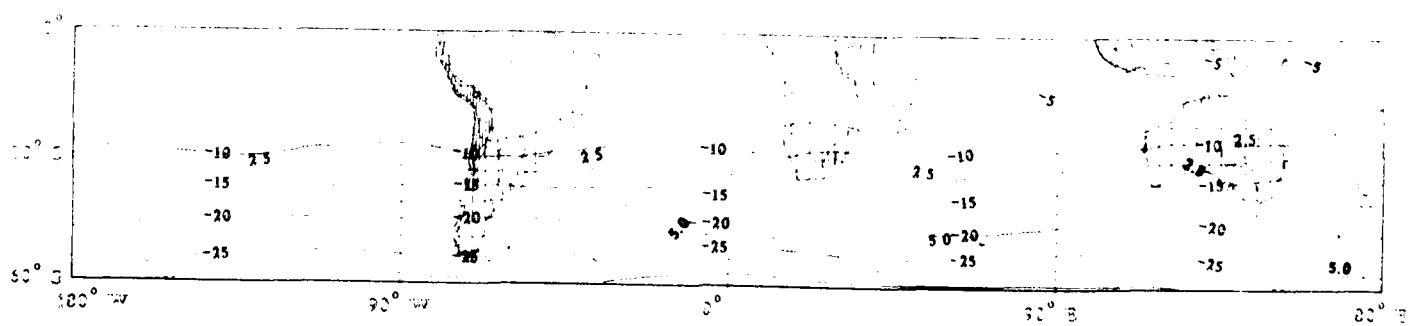
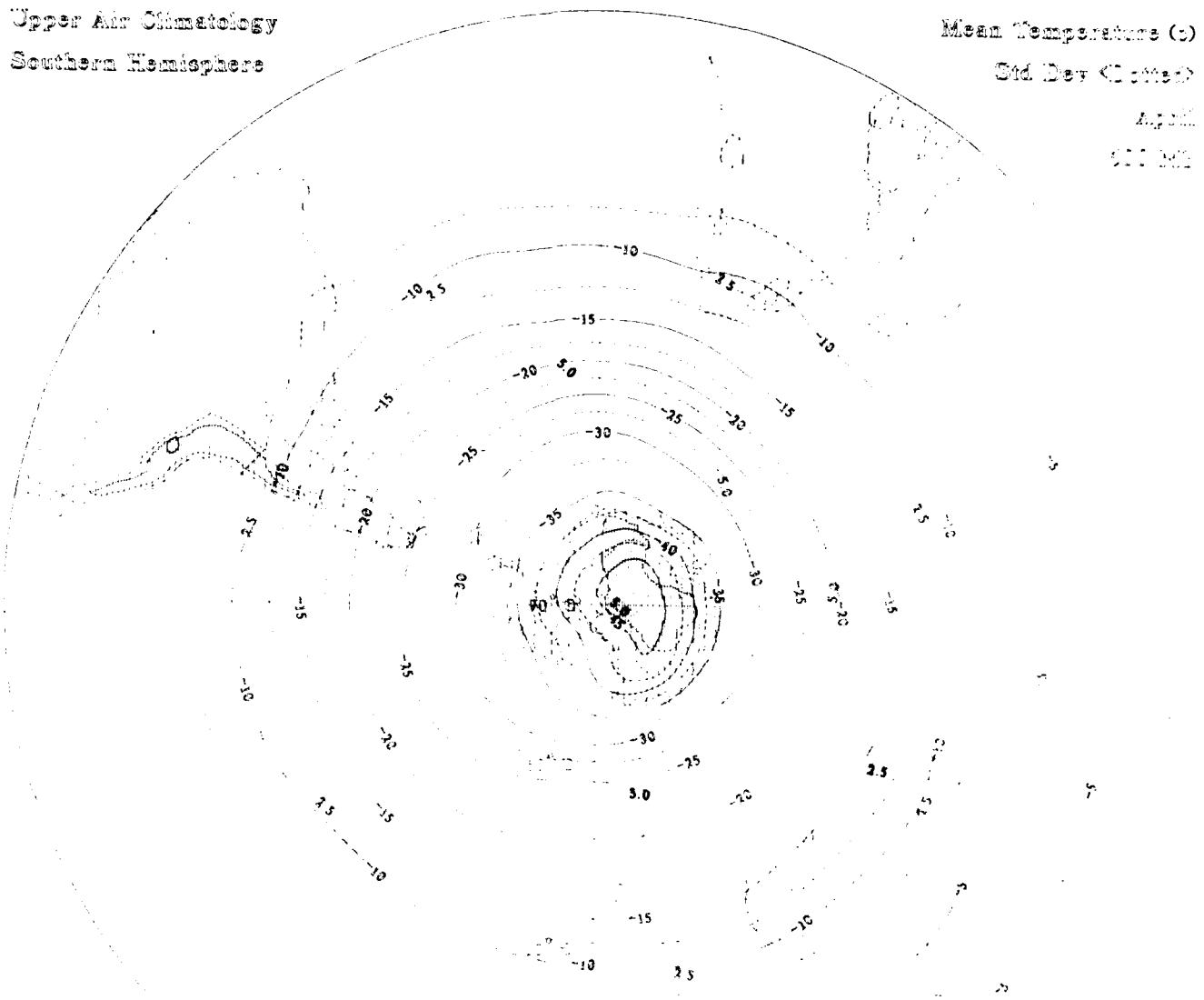
Northern Hemisphere



Upper Air Climatology Southern Hemisphere

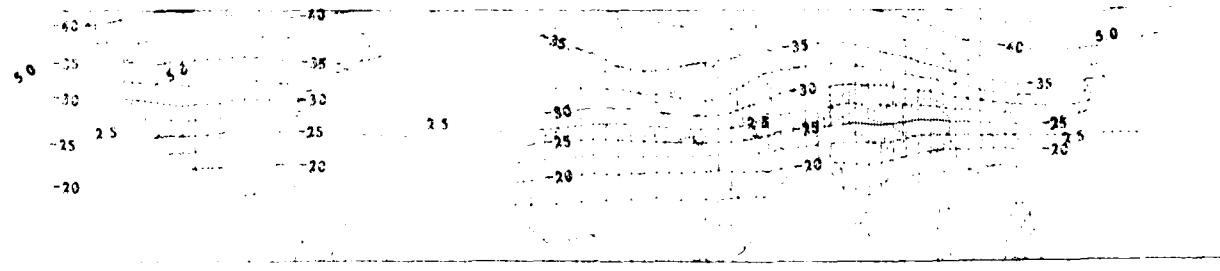
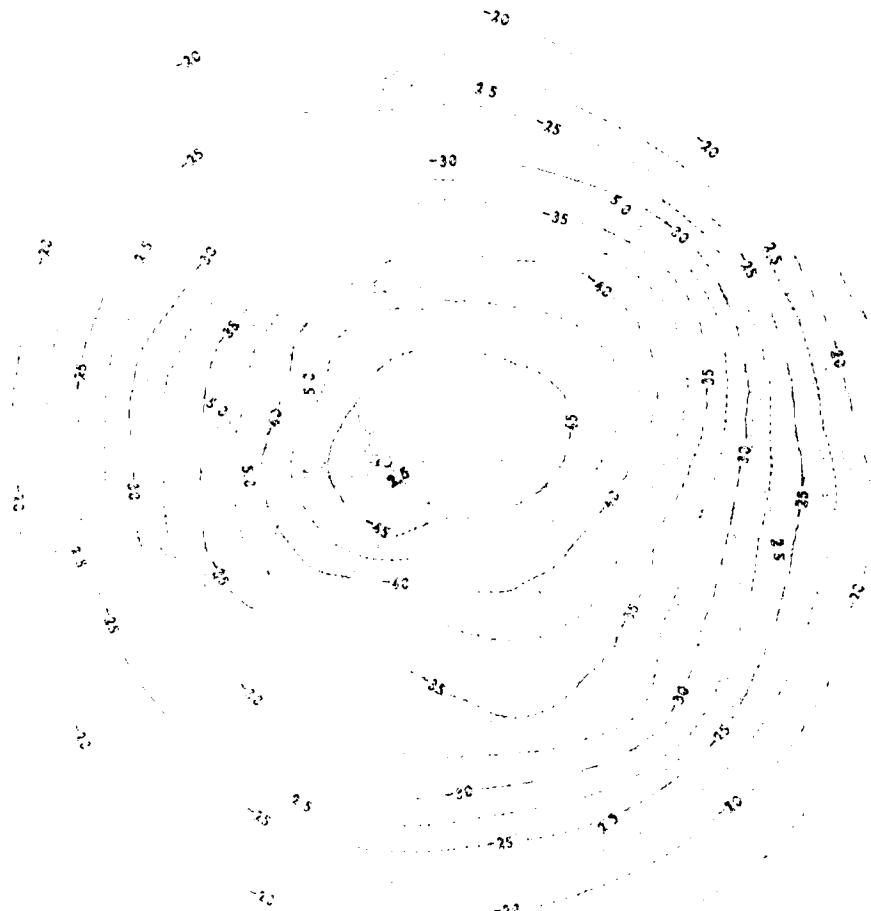
Mean Temperature (°)

Std Dev <0.000>



Mean Temperature (°C)
Sea Level (Cont'd.)
S. Polar
4000 M.

Upper Air Climatology
Northern Hemisphere



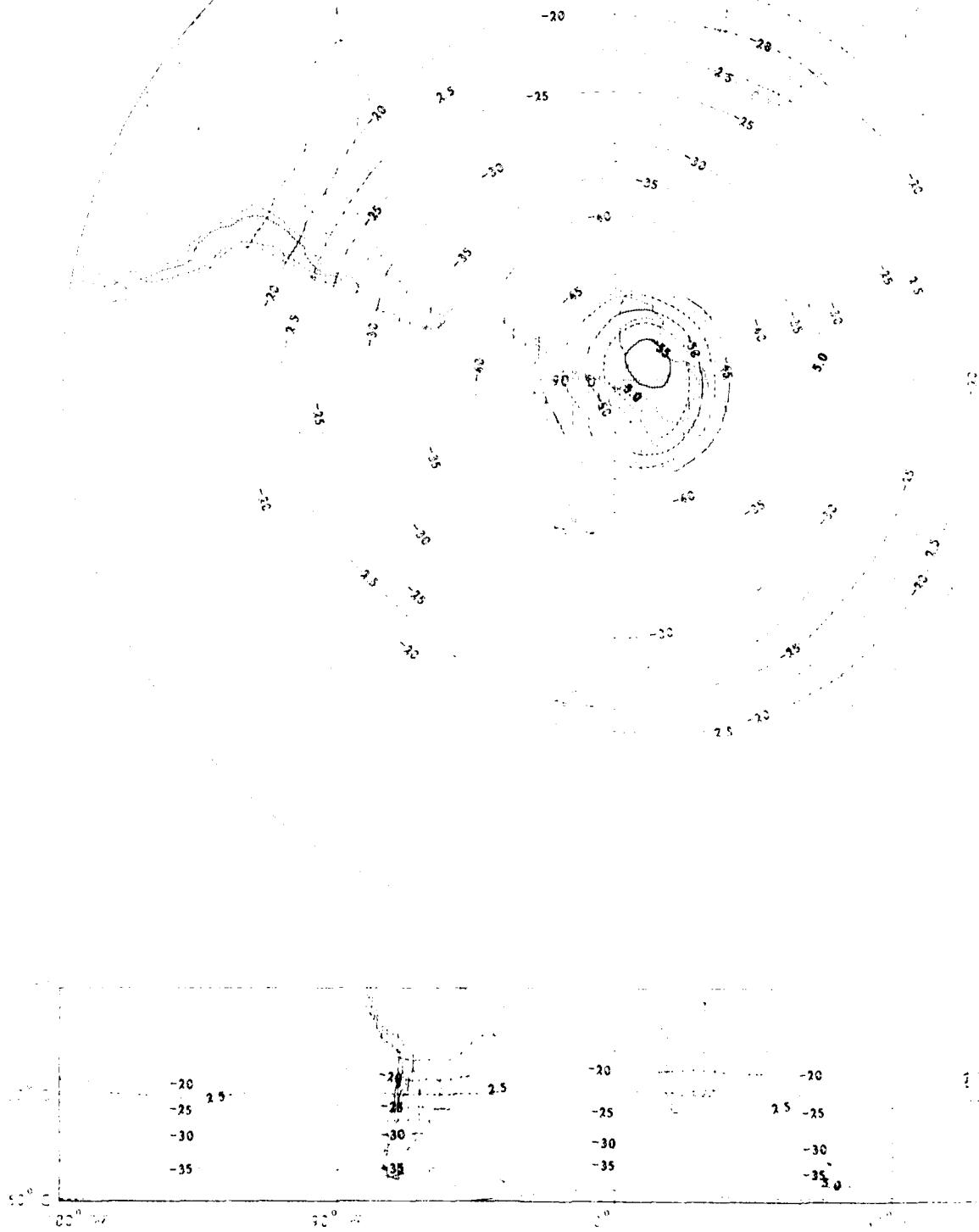
Upper Air Climatology Southern Hemisphere

第2章 第3節 第4節 (5)

Oct. 12th 1930

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• 100 •



Mean Temperatures (°C)

Std. Dev. < Dotted >

April

500 MB

Upper Air Climatology

Northern Hemisphere

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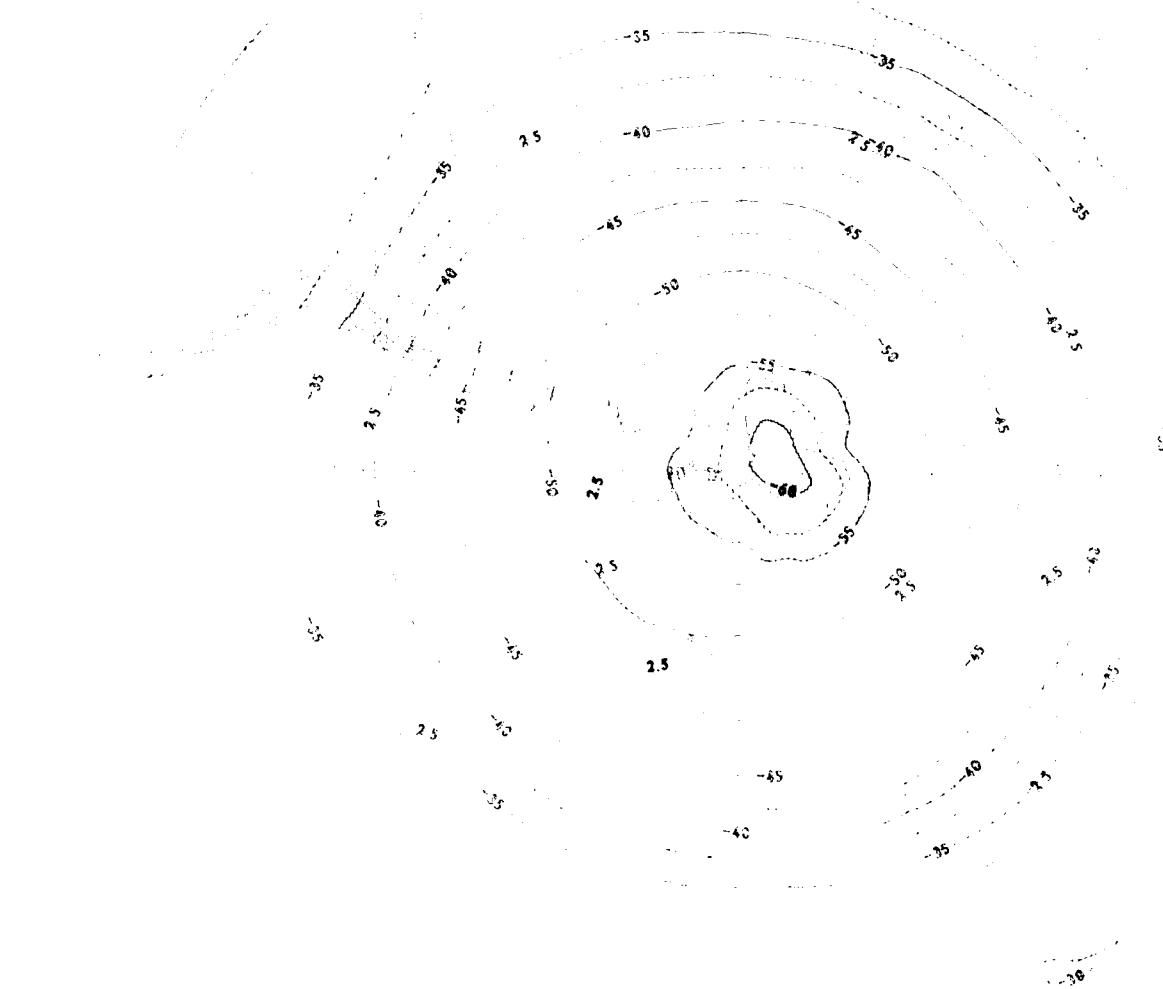
Upper Air Climatology
Southern Hemisphere

Mean Temperature (°)

Std Dev < 0.5°C

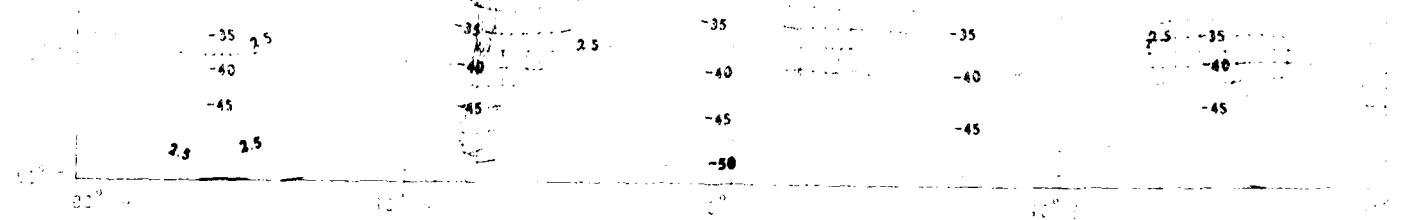
April

210 mb



Std. Dev. < 2.5

Std. Dev. < 2.5



Mean Temperature (°C)

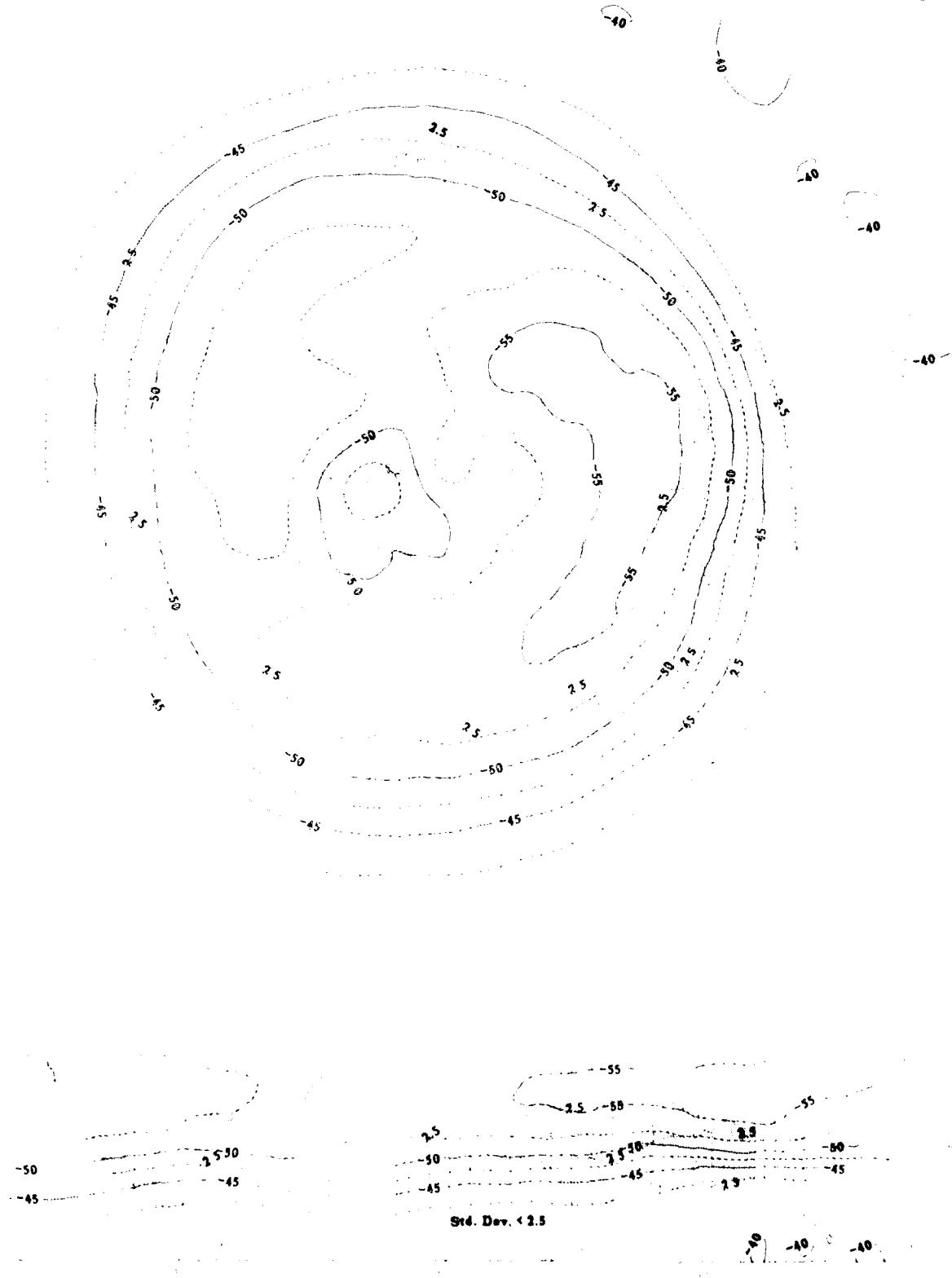
Std Dev < Dotted >

April

250 MB

Upper Air Climatology

Northern Hemisphere



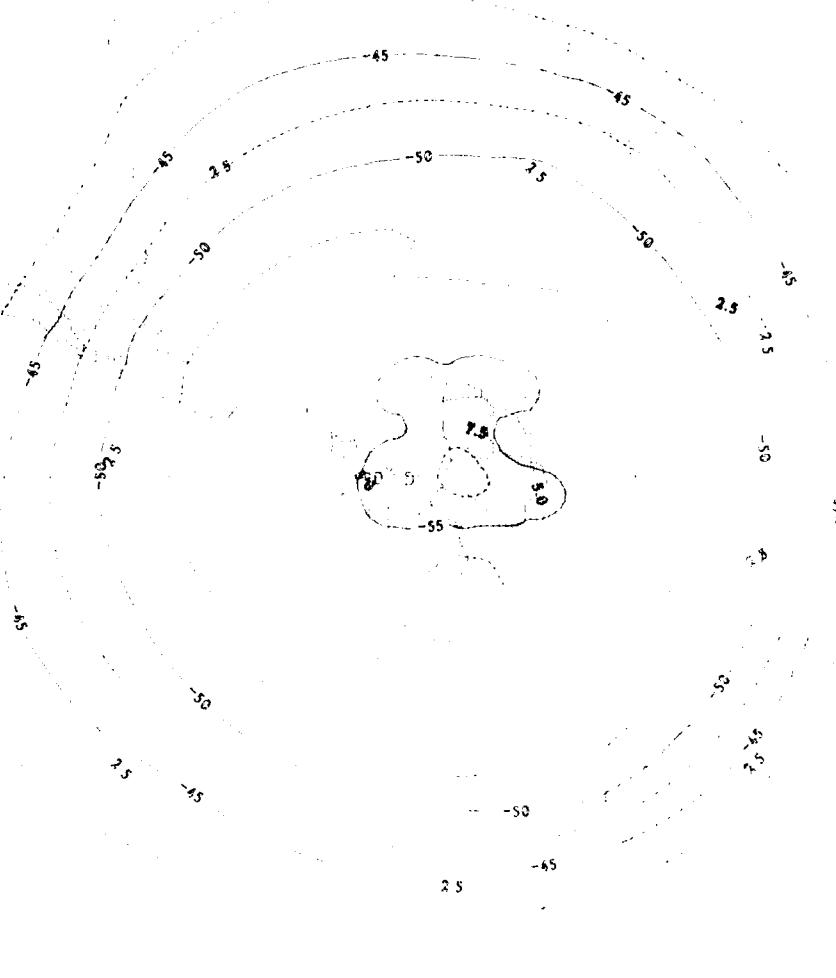
Upper Air Climatology
Southern Hemisphere

Mean Temperature (°C)

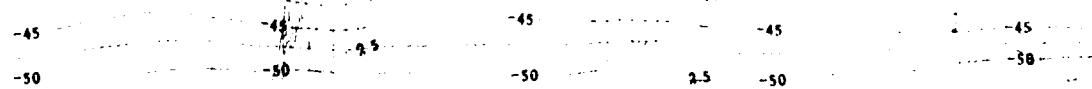
Std Dev < Dotted >

April

250 MB



Std. Dev. < 2.5



Mean Temperature (°)

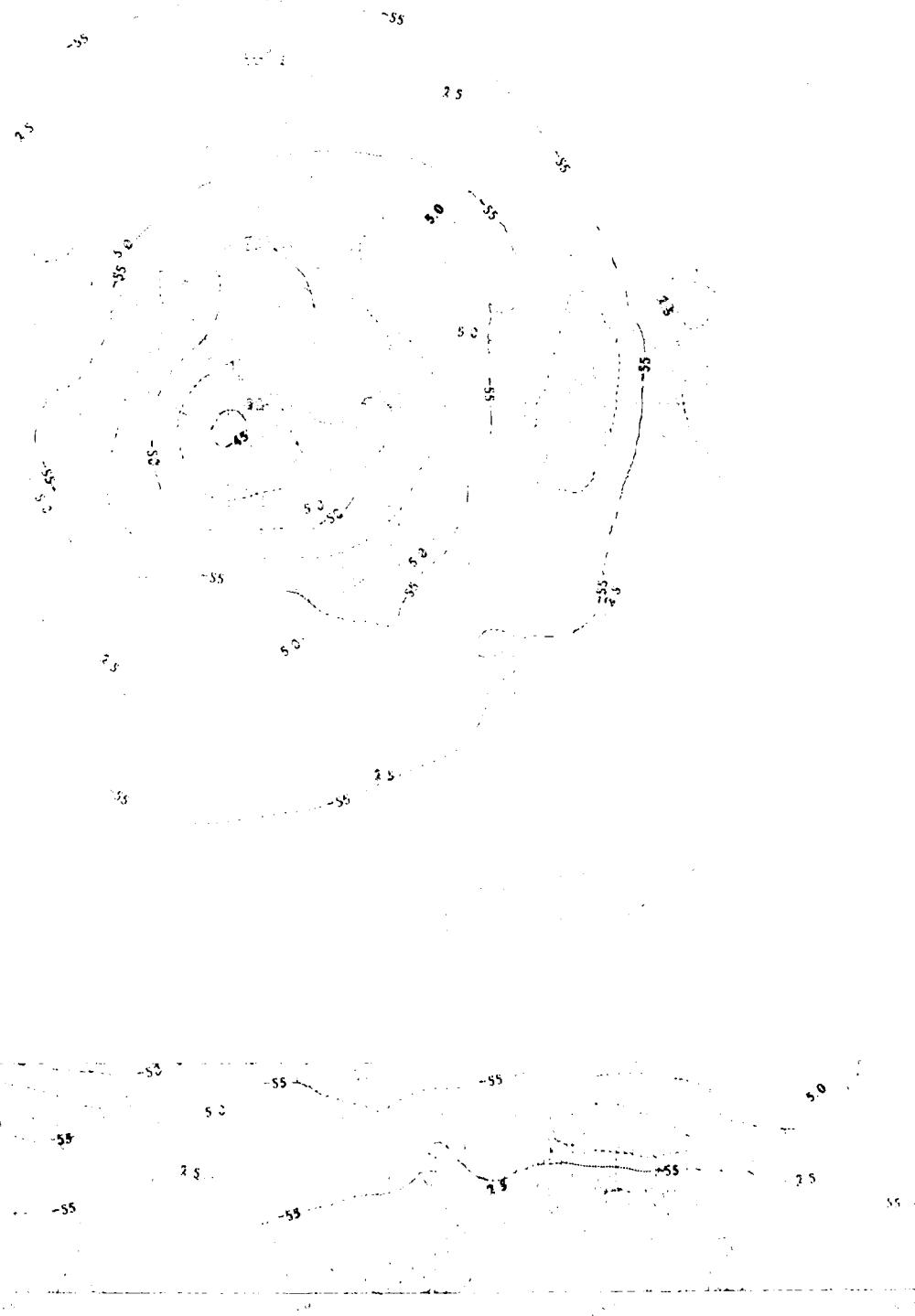
Lat. 10° S. (cont'd)

Aug.

1921

Upper and Lower Layer

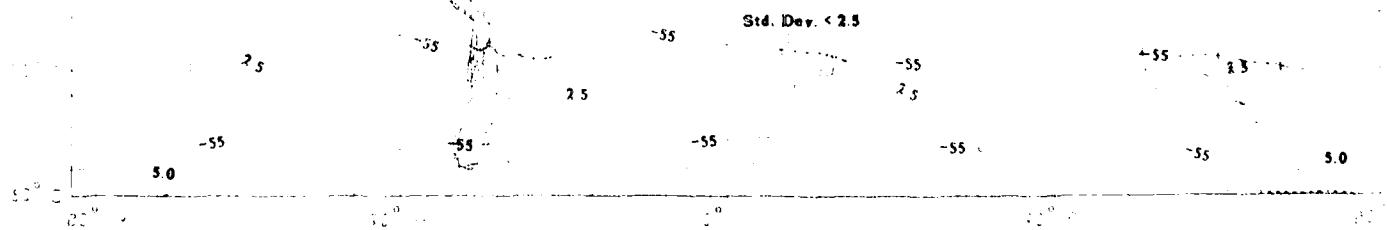
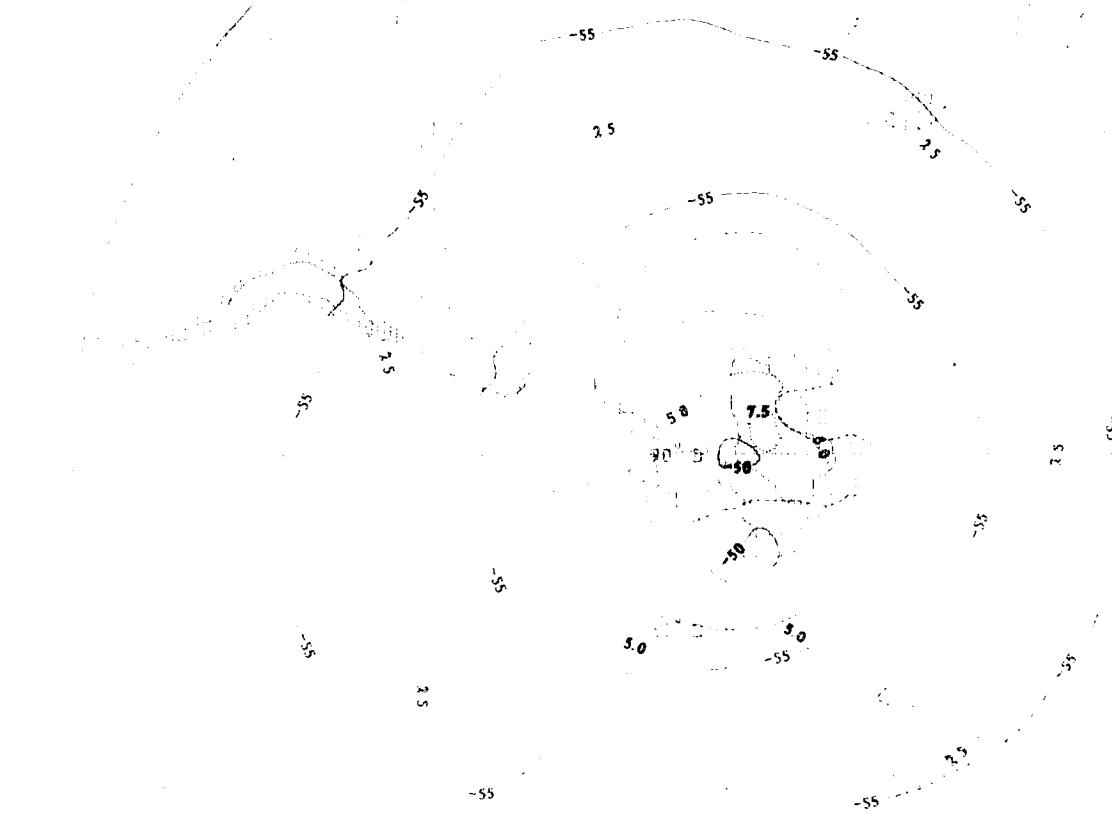
Heights (Metres)



Upper Air Climatology
Northern Hemisphere

Mean Temperature (°)
Std Dev < 0.5

Avg.
60.1 RH



Mean Temperature (°C)

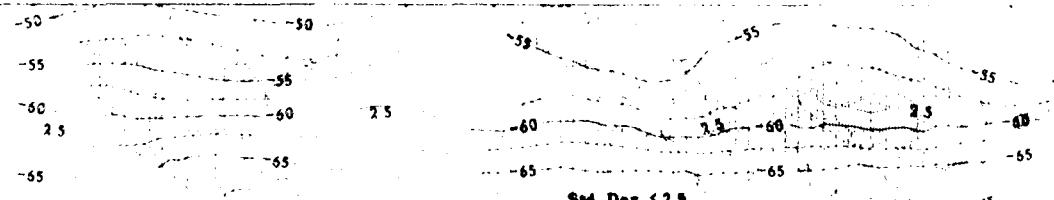
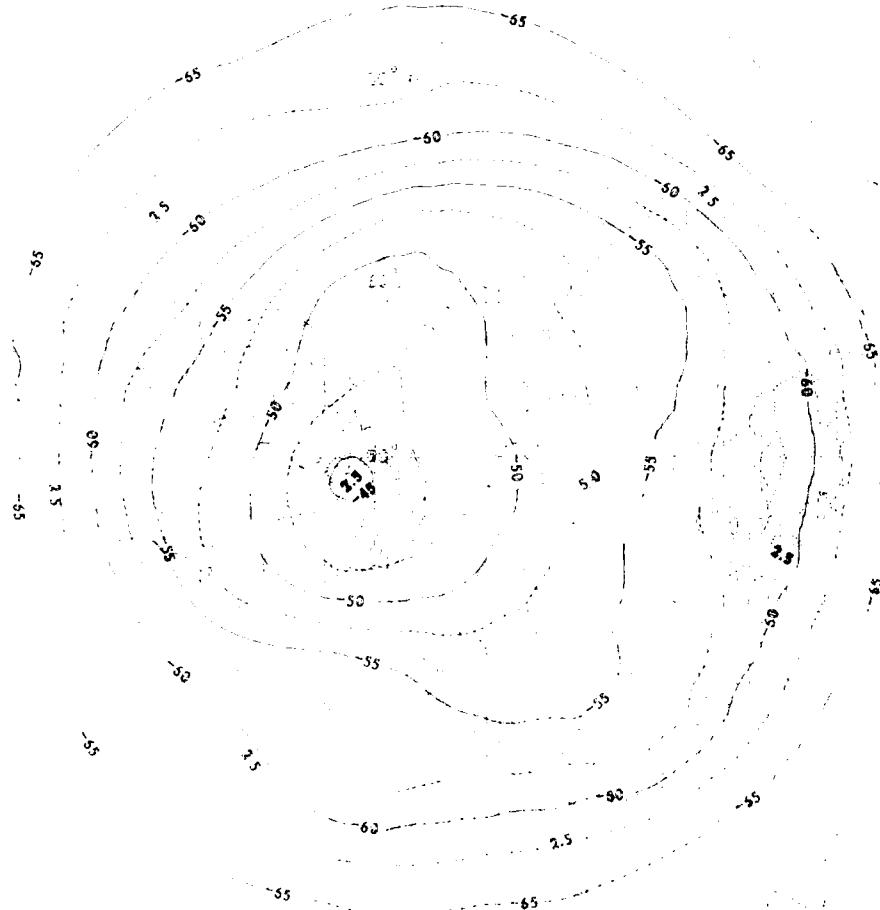
Sed. Dev. < Dotted >

Aug 20

101 MB

Upper Air Climatology

Northern Hemisphere



Sed. Dev. < 2.5

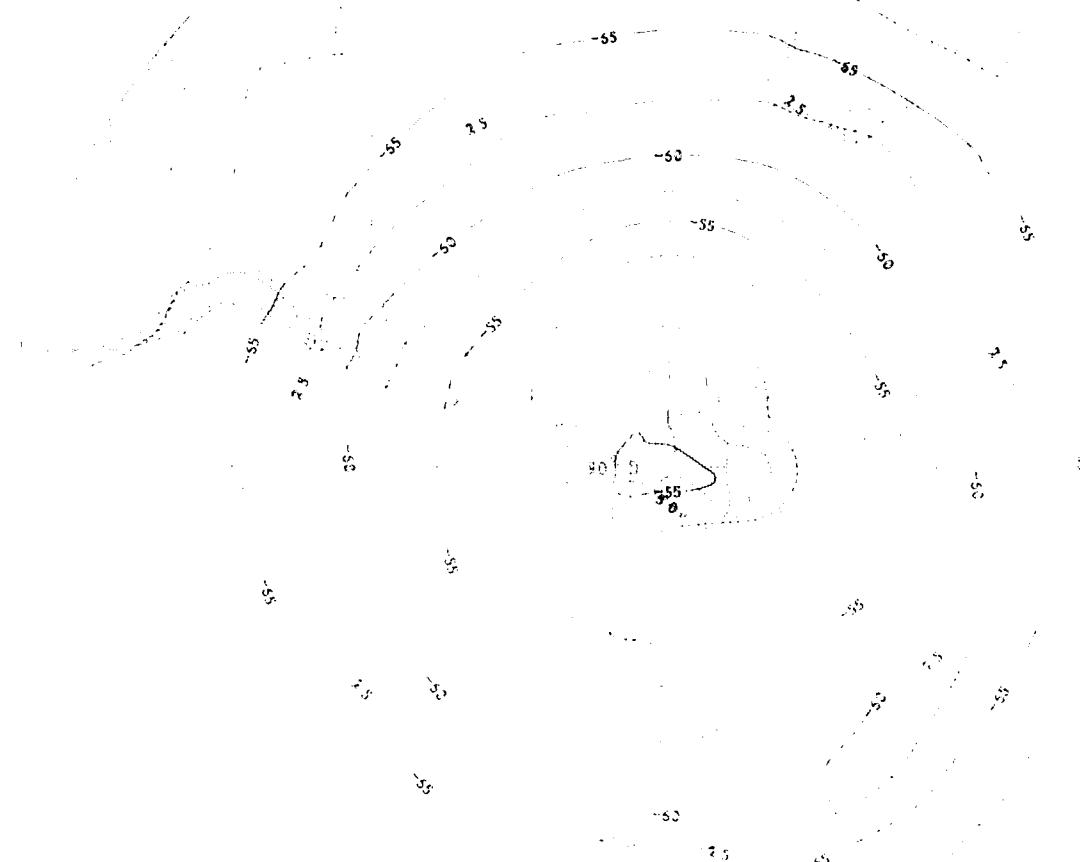
TOPSOIL ECOLOGY

Southern Hemisphere

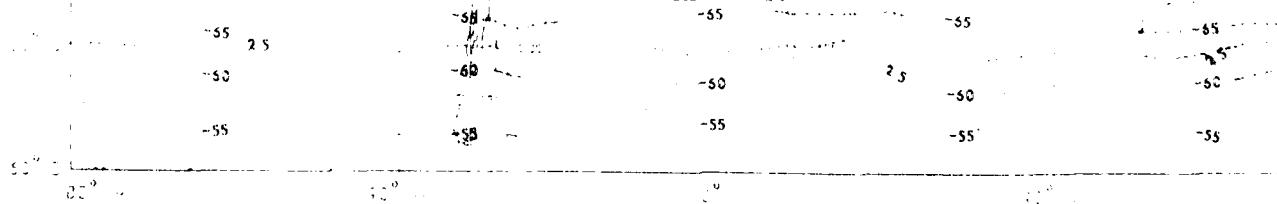
Mean Temperature ($^{\circ}$)Std Dev (Δ Dev.)

Avg Dev.

Std Dev



Std. Dev. < 2.5



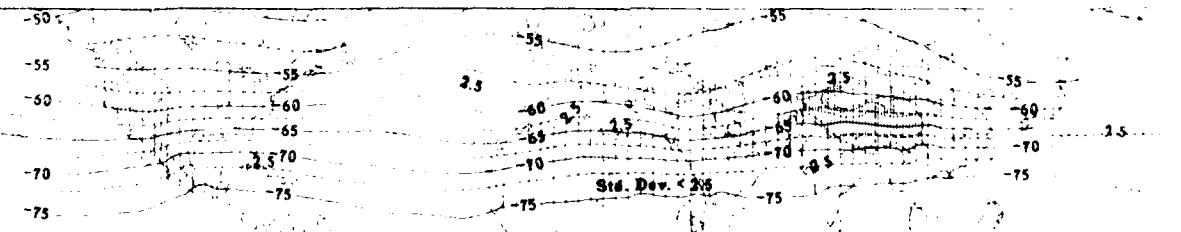
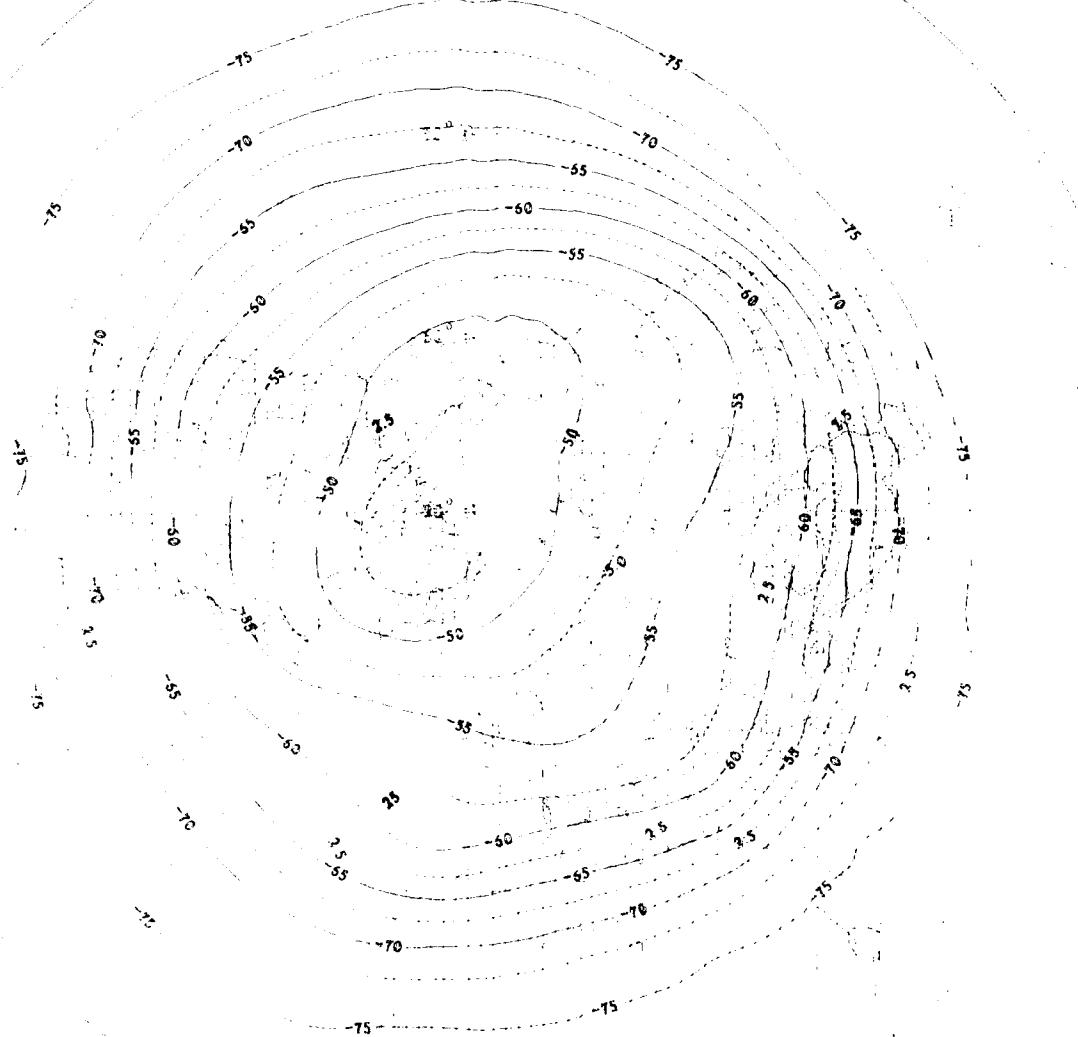
Mean Temperature (°)

Std. Dev. < Dotted >

April

100 mb

Upper Air Climatology
Northern Hemisphere



Upper Air Climatology

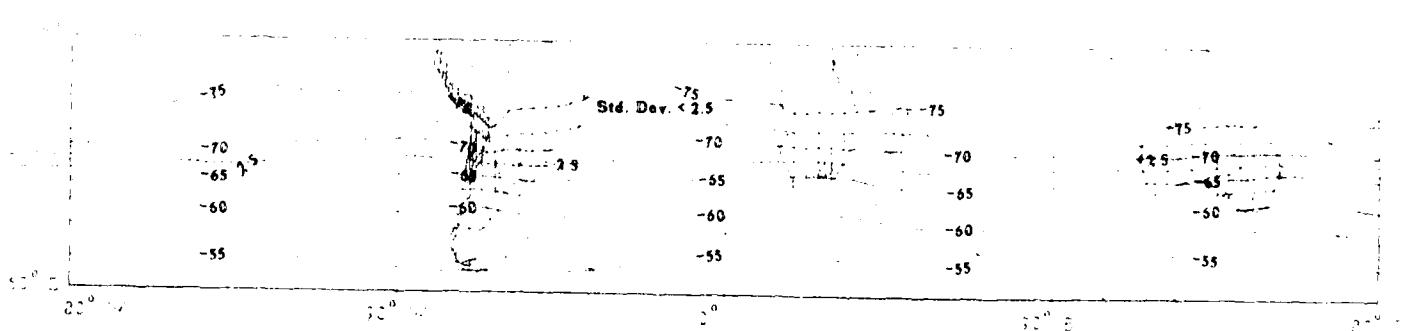
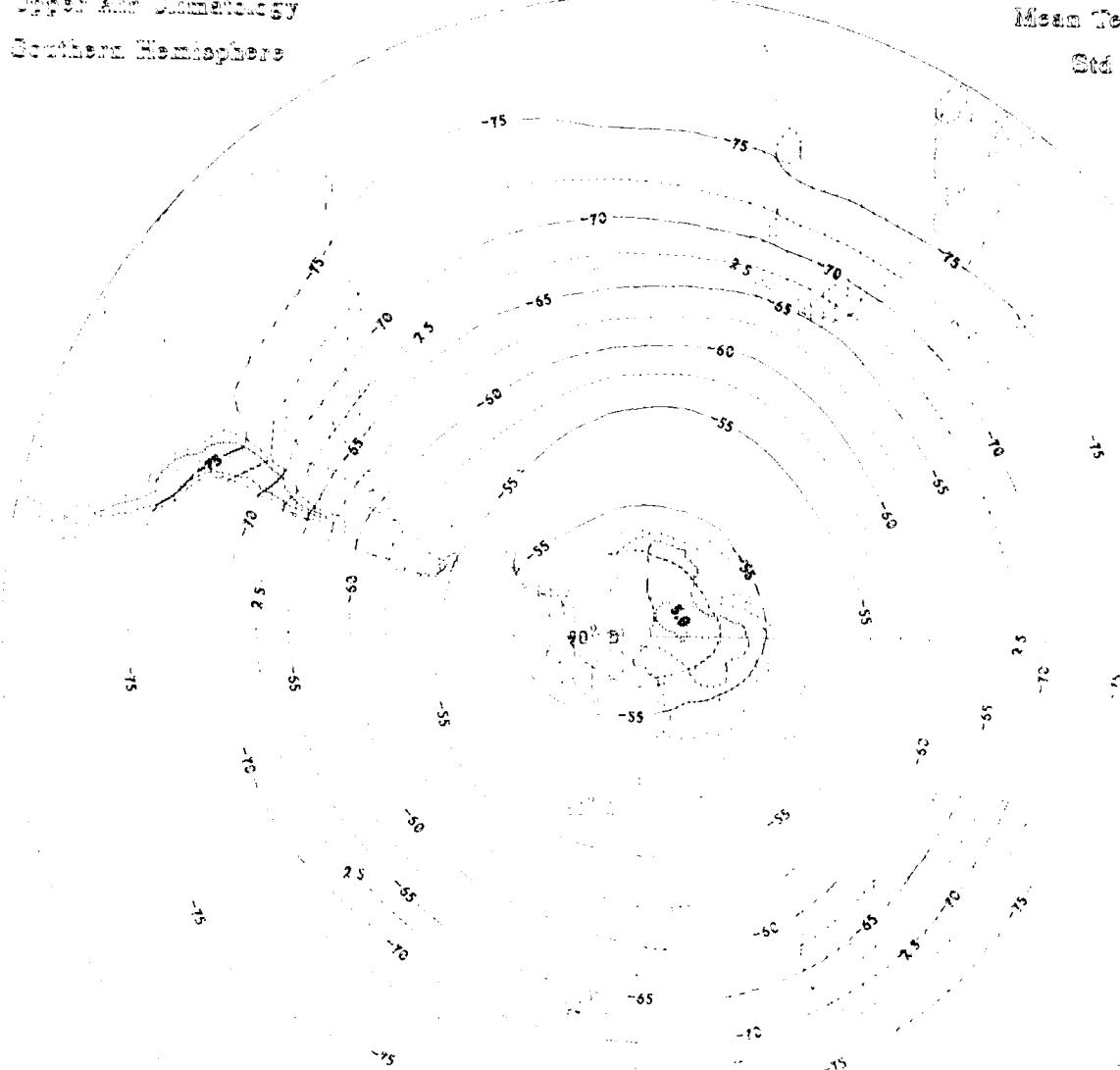
Northern Hemisphere

Mean Temperature (°)

Std Dev (Centr.)

April

101.12



Mean Temperature (°C)

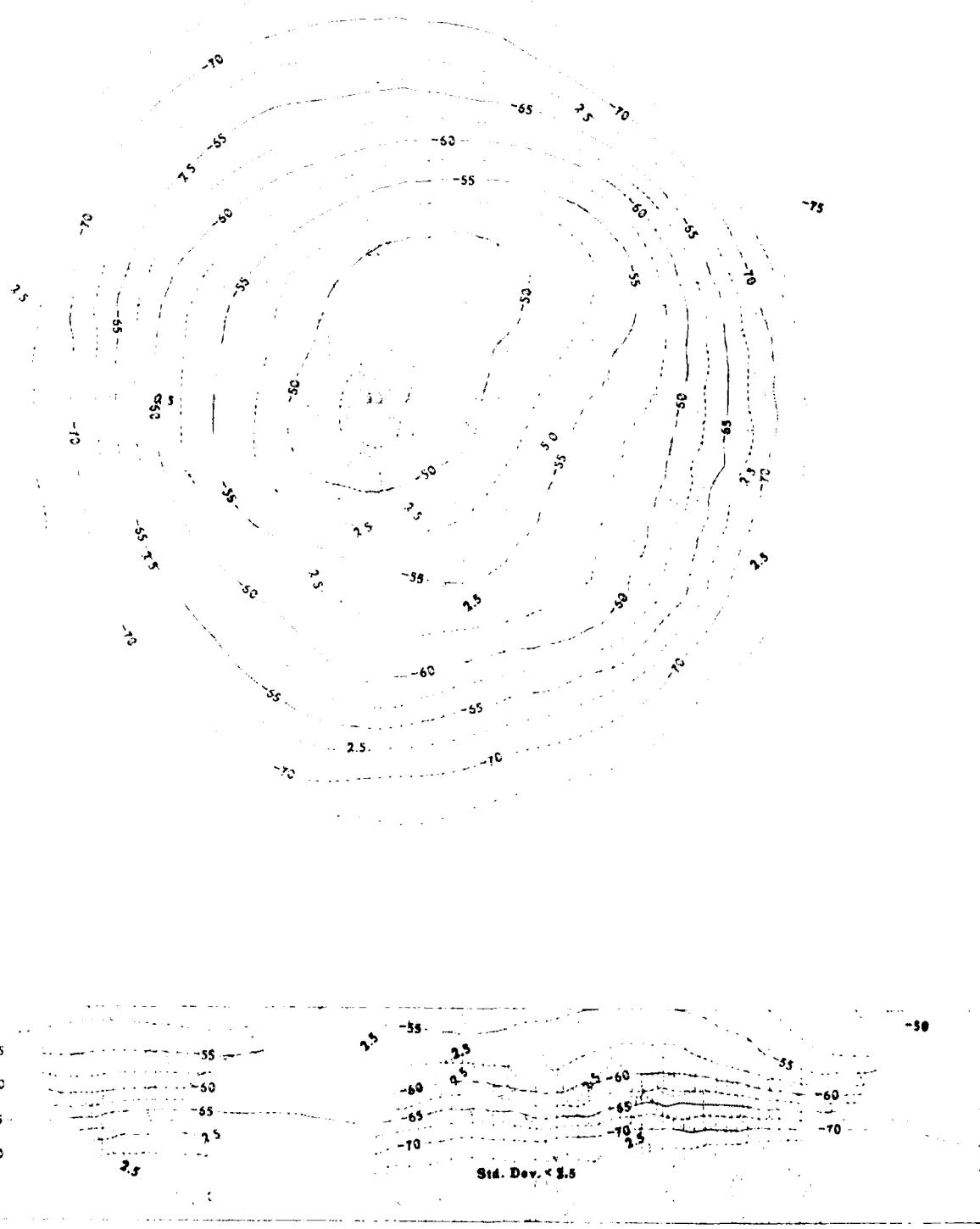
Std Dev < Dotted >

April

700 MB

Upper Air Climatology

Northern Hemisphere



Upper Air Climatology

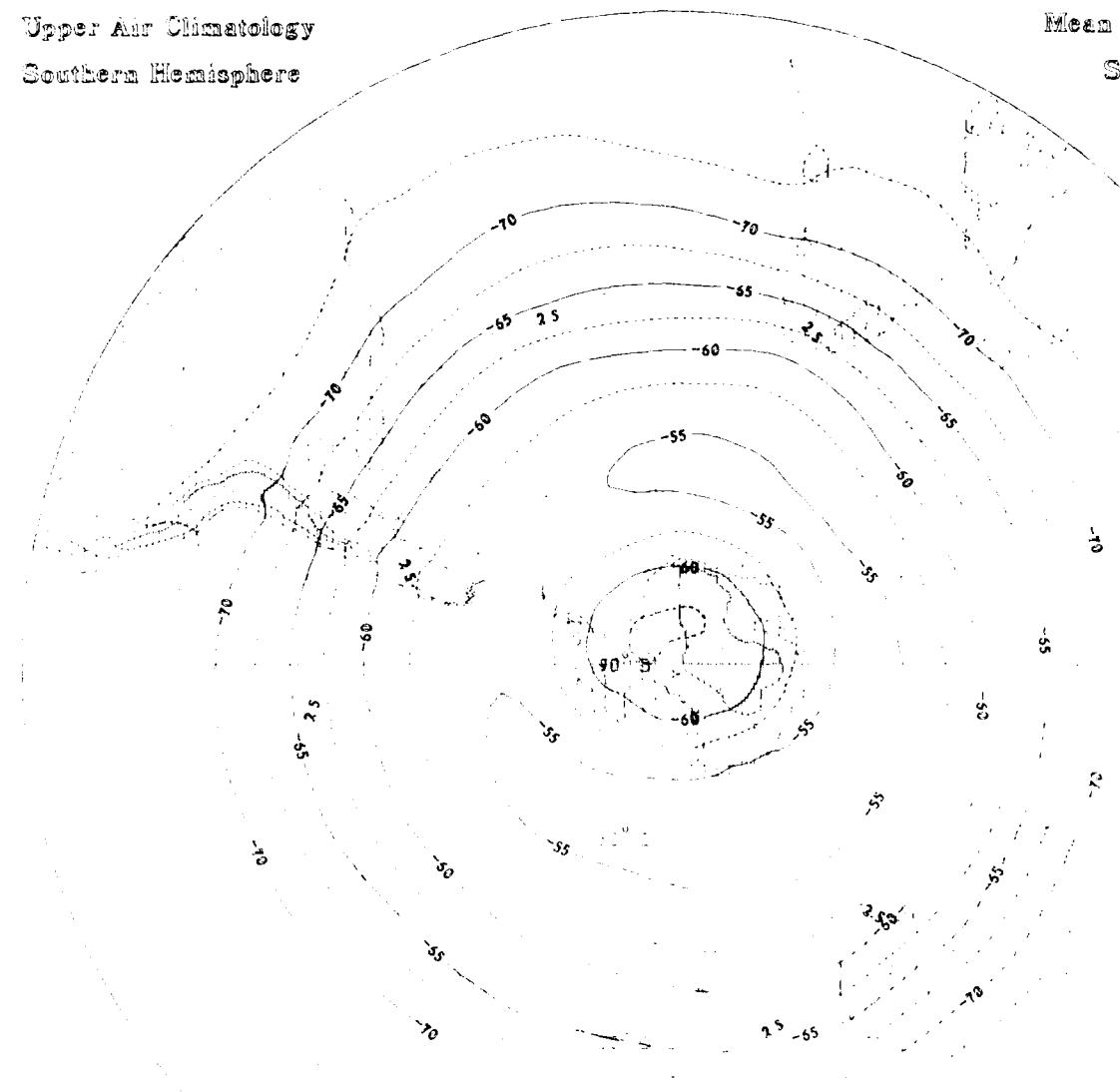
Southern Hemisphere

Mean Temperature ($^{\circ}$)

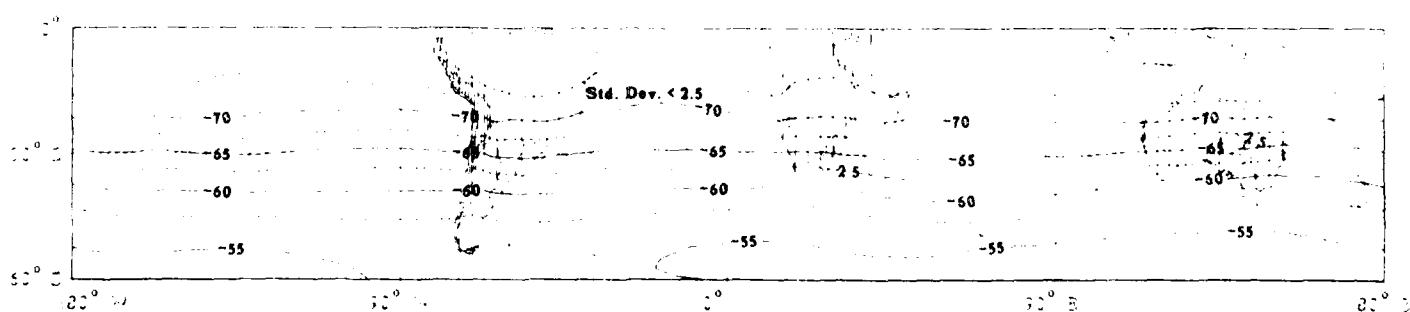
Std Dev < Dotted >

April

700 MB



Std. Dev. < 2.5



Mean Temperature (°C)

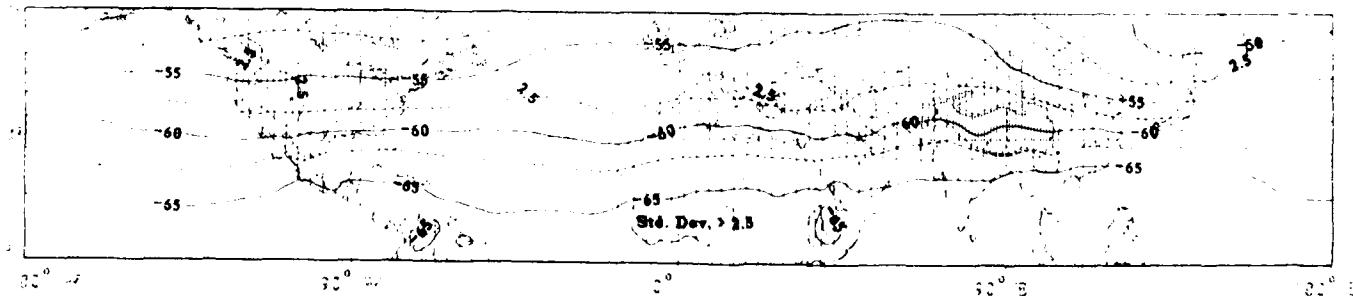
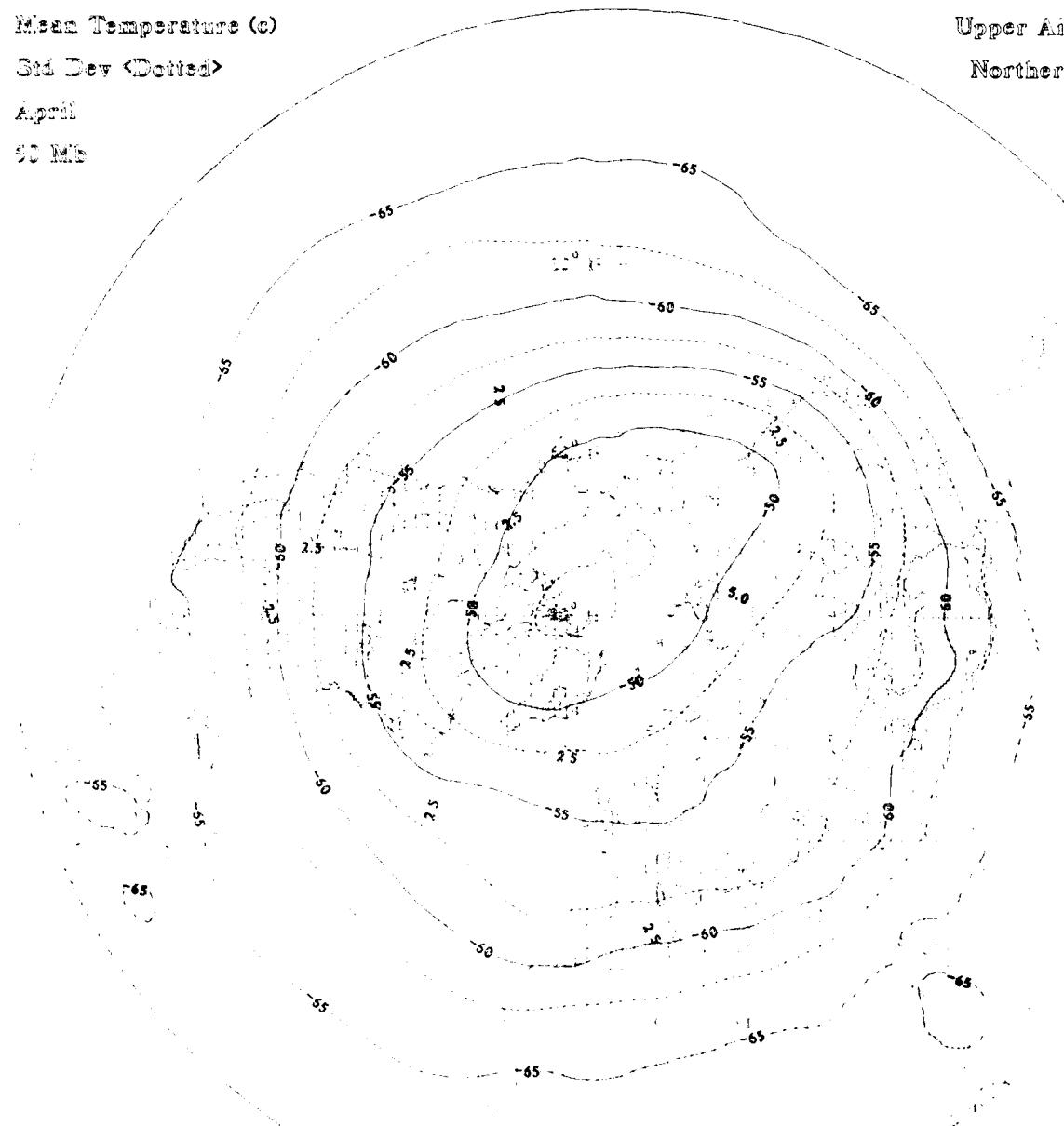
Std Dev < Dotted >

April

90 Mb

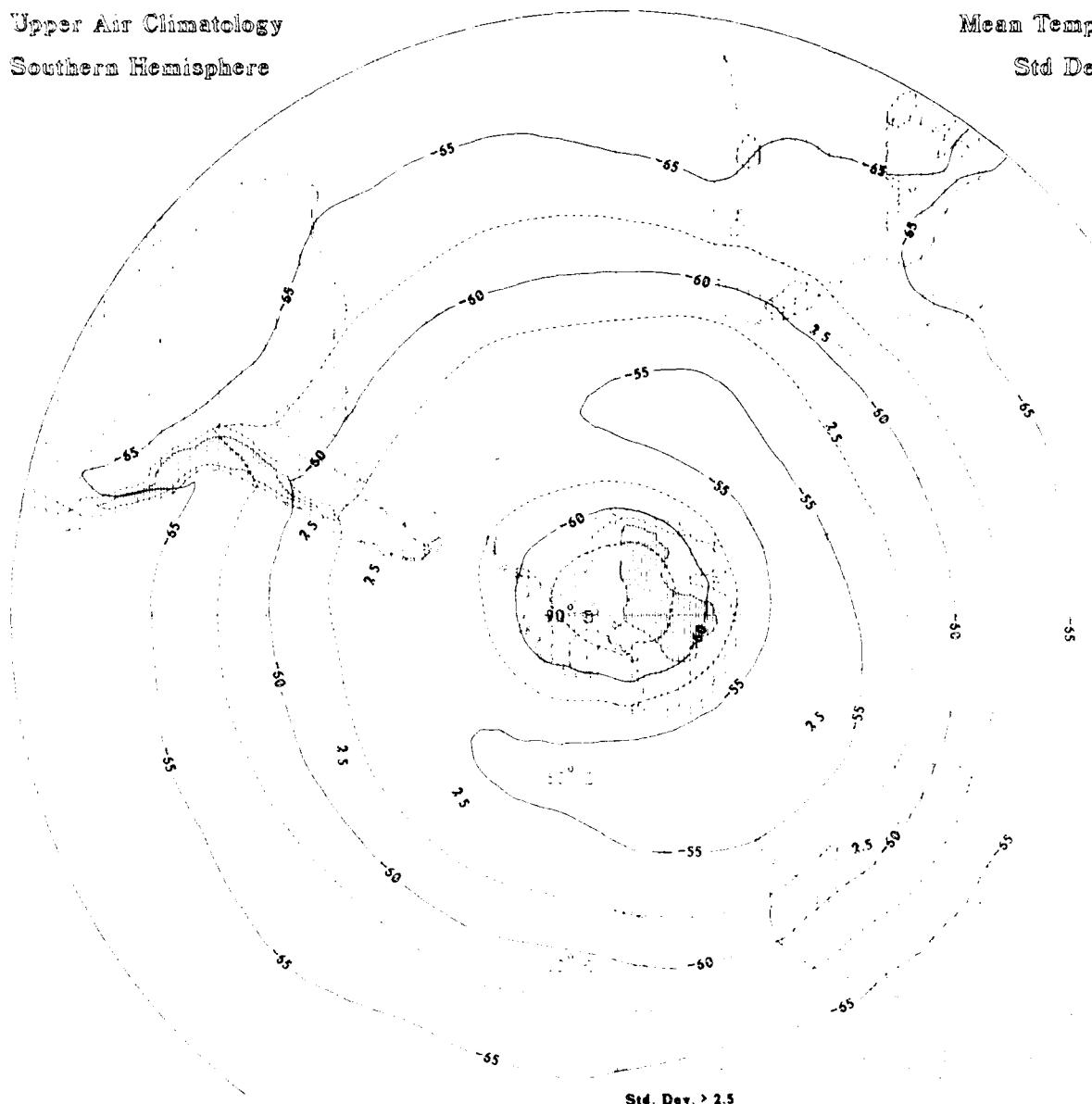
Upper Air Climatology

Northern Hemisphere

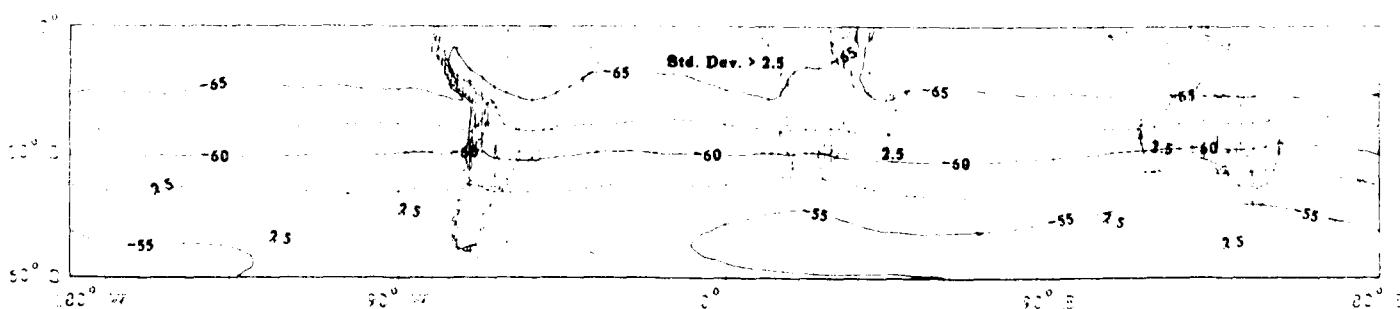


Upper Air Climatology
Southern Hemisphere

Mean Temperature (°C)
Std Dev < Dotted >
April
50 Mb



Std. Dev. > 2.5



Mean Temperature (°C)

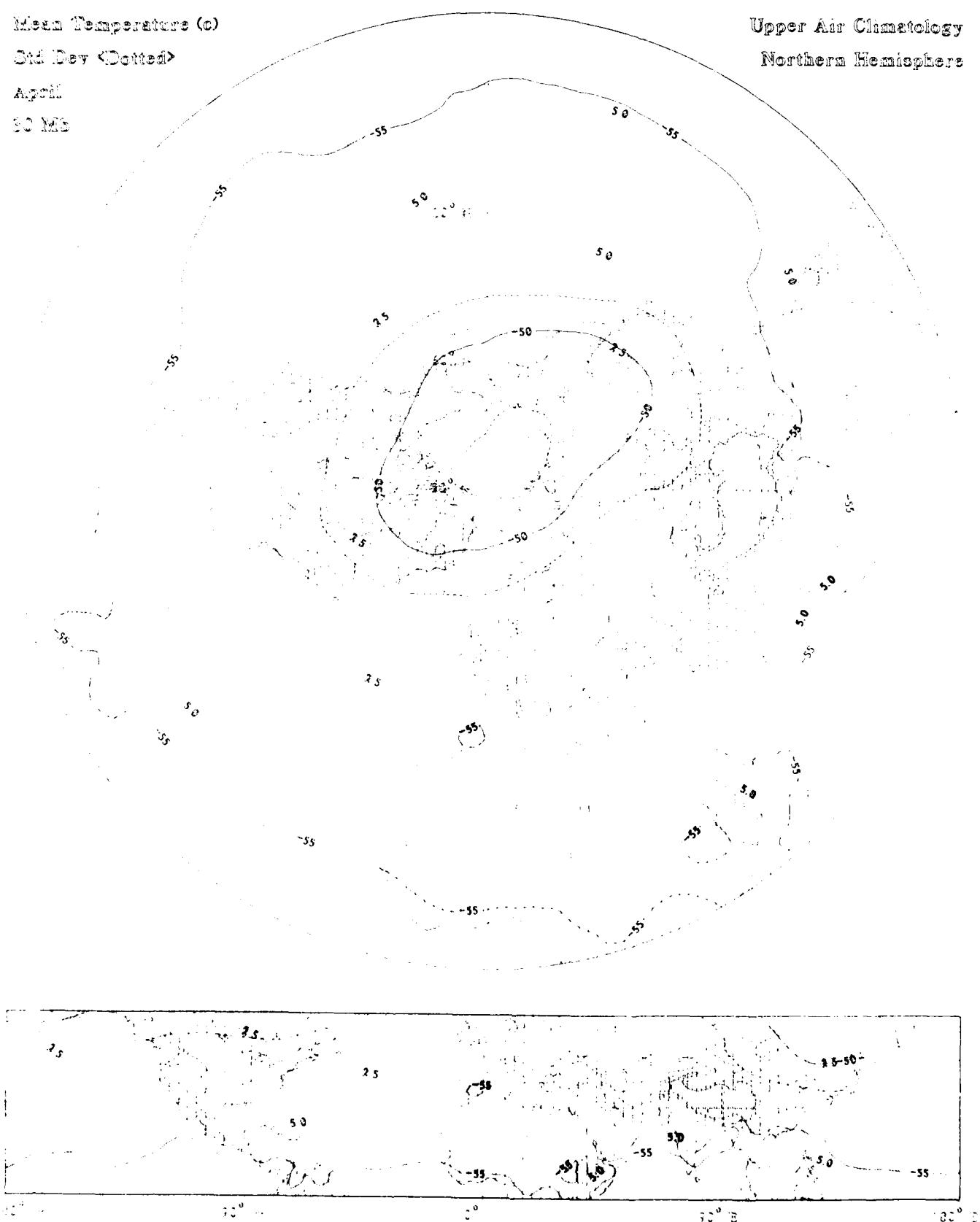
Std Dev (Dotted)

April

10 Mb

Upper Air Climatology

Northern Hemisphere



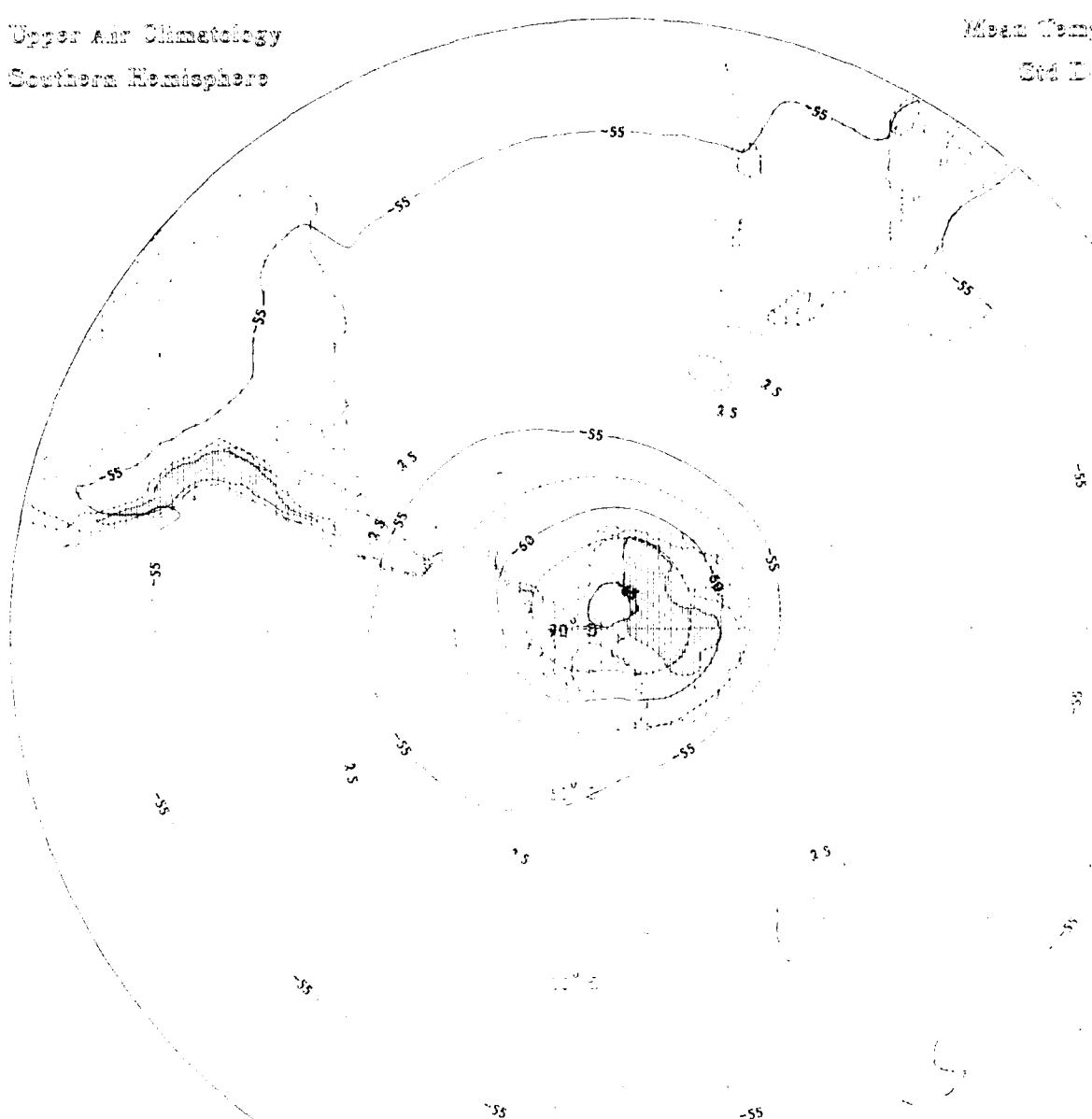
Upper Air Climatology
Southern Hemisphere

Mean Temperature (°)

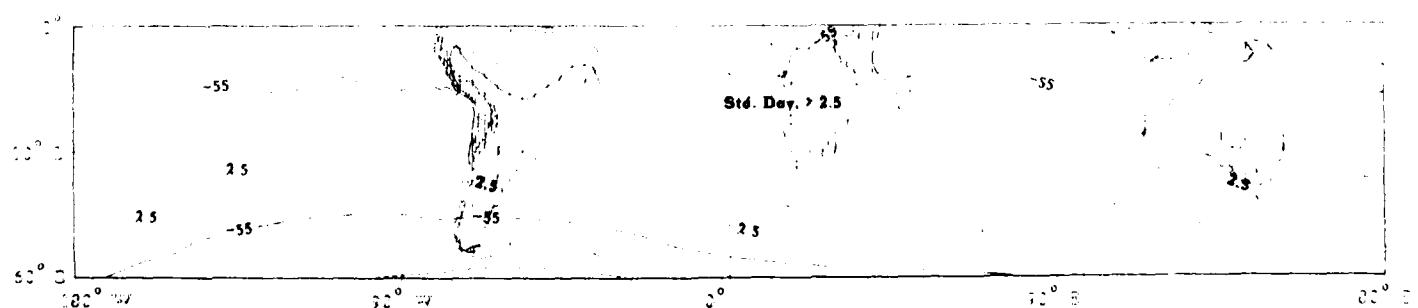
Std Dev < Dotted

April

90 MI



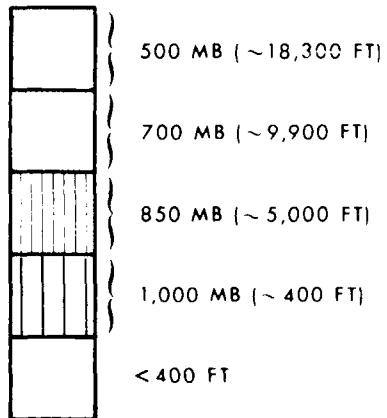
Std. Dev. > 2.5



DEW POINT
(6 LEVELS, 1000 TO 300 MB)

- Contours of mean dew point (solid and dashed lines) in °C; solids labeled, dashed intermediates unlabeled.
- Dew point labeled interval: 5°C
- Contours of standard deviation of dew point (dotted lines) in °C
- Standard deviation of dew point labeled interval: 2.5°C
- Contours blanked for geographic areas with elevations exceeding specified geopotential heights

ELEVATION SCALE



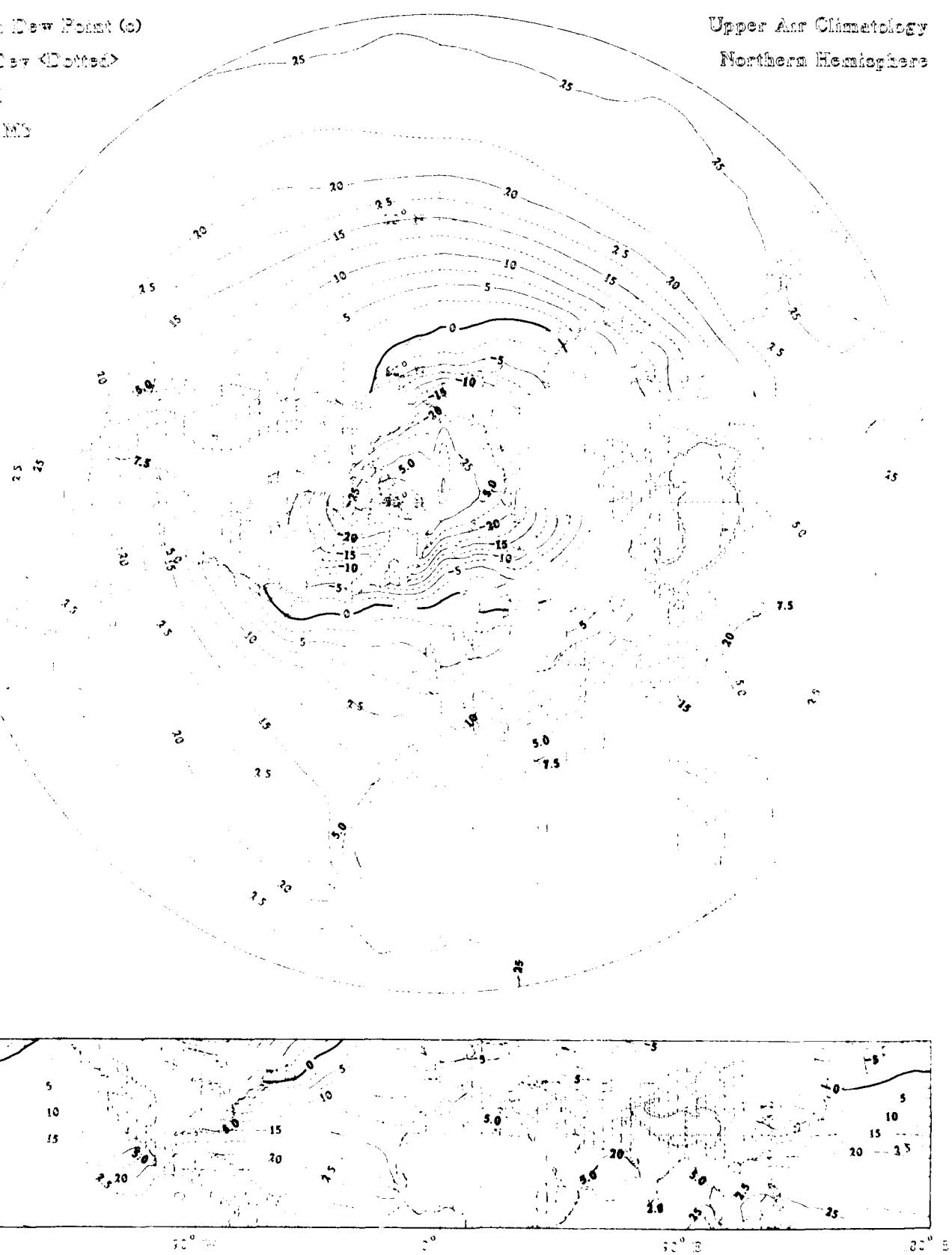
Mean Dew Point (°)

Dew Point (Dotted)

April

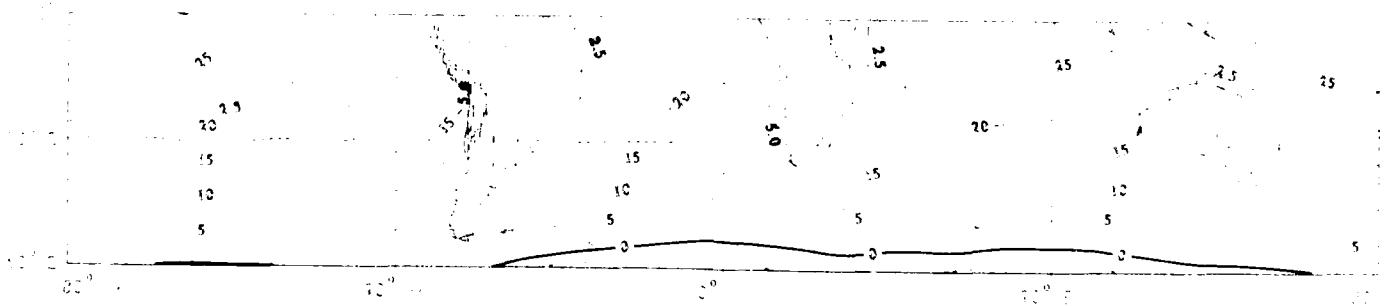
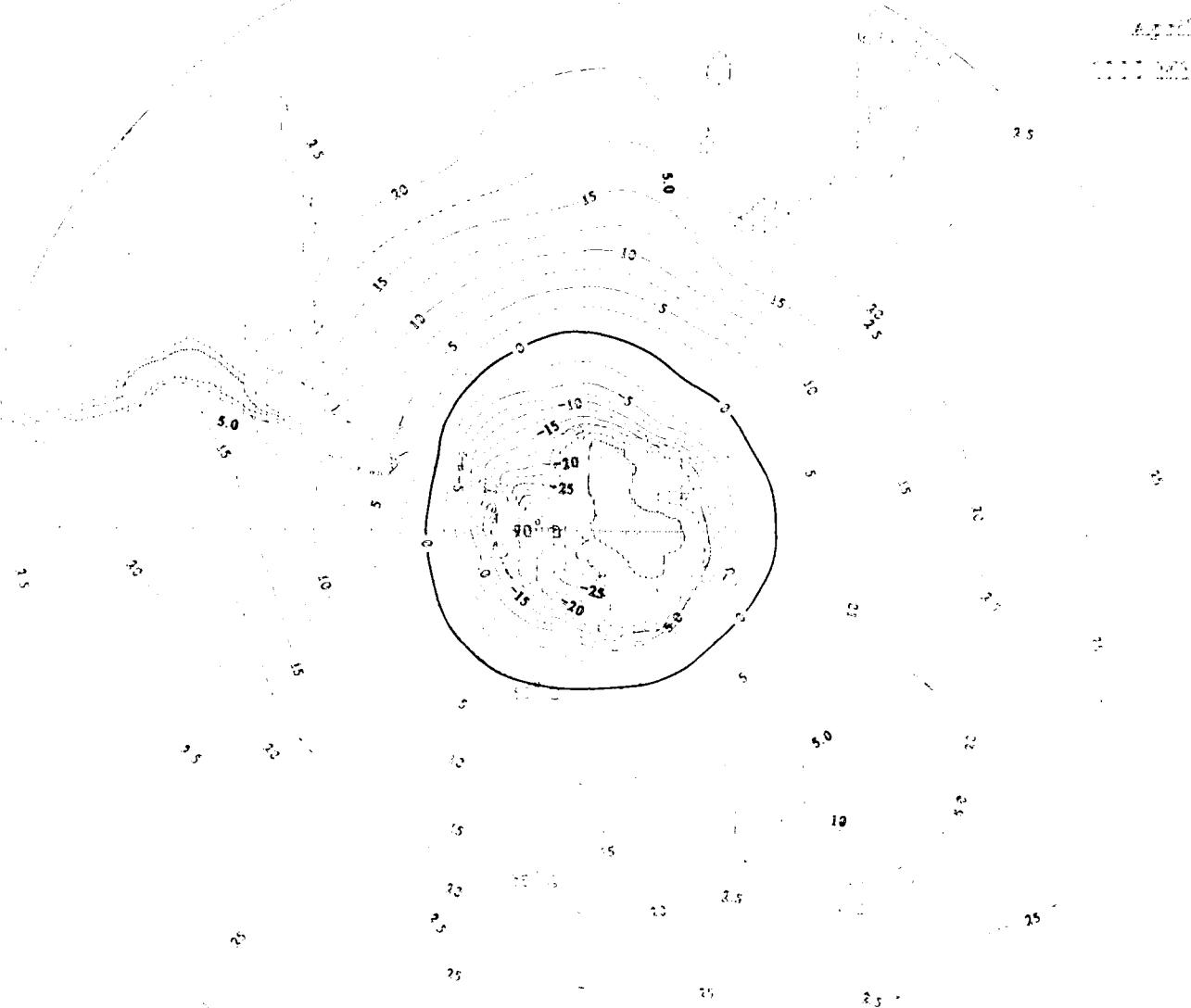
1937 NCEP

Upper Air Climatology
Northern Hemisphere



Digest and Chemistry
Benthic Macrofauna

Mean New Moon (c)
Oct. Dec. & Jan. (d)



Mean Dew Point (°C)

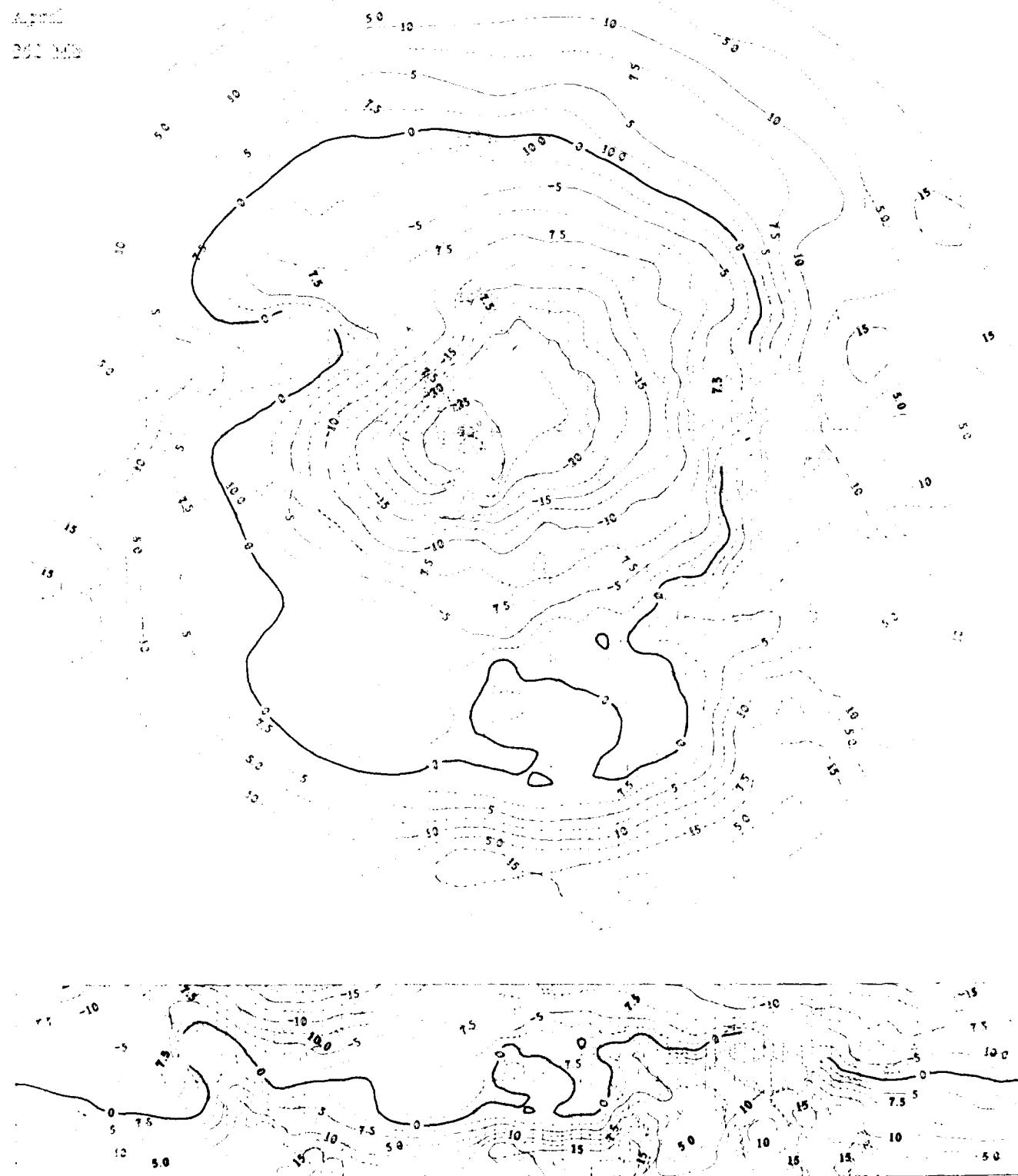
Dew Dev (Dotted)

April

260 MB

Upper Air Climatology

Northern Hemisphere



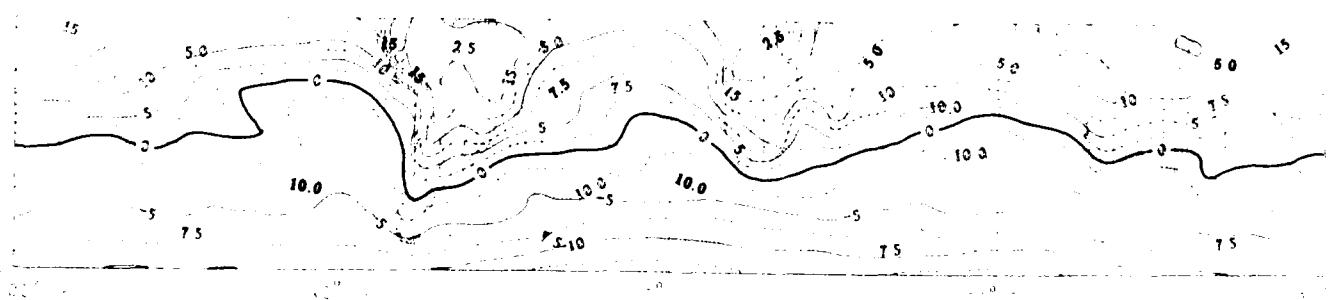
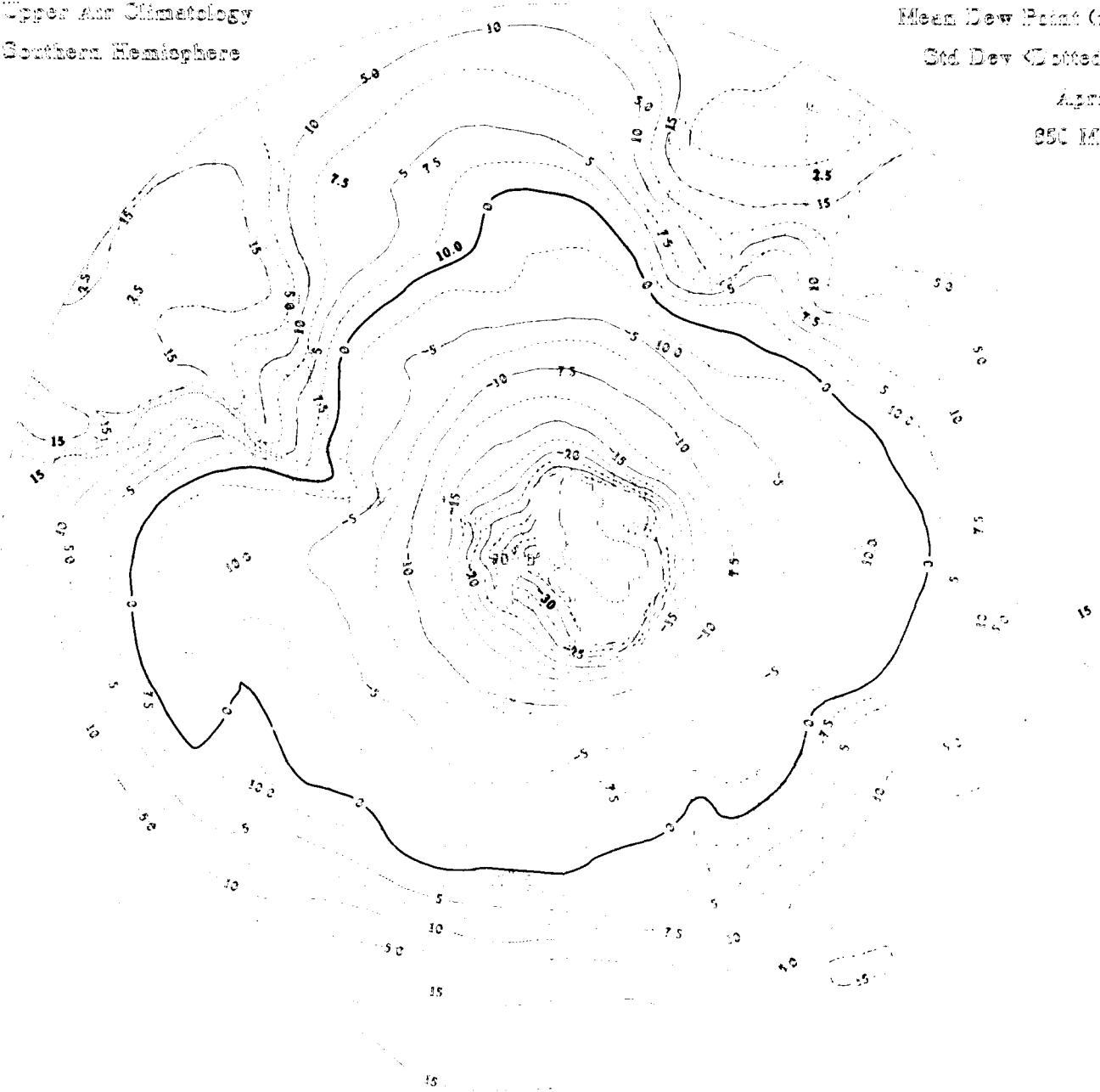
Upper Air Climatology
Southern Hemisphere

Mean Dew Point (°)

Std Dev < Dotted >

April

850 MB



Mean Dew Point (°c)

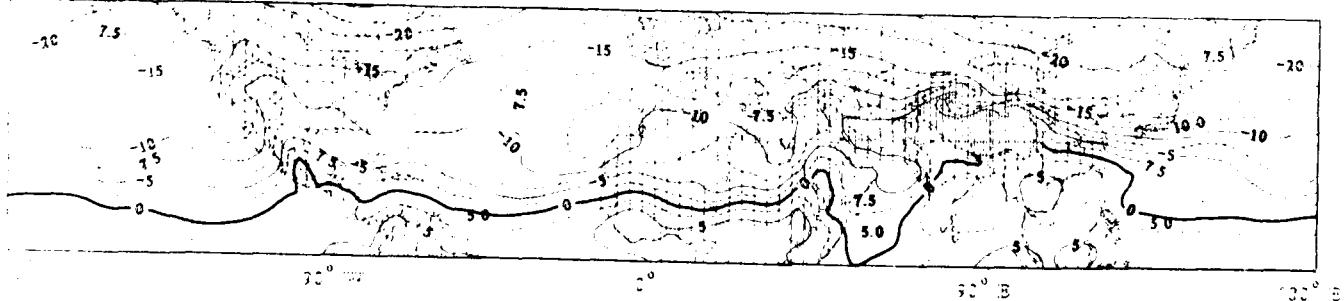
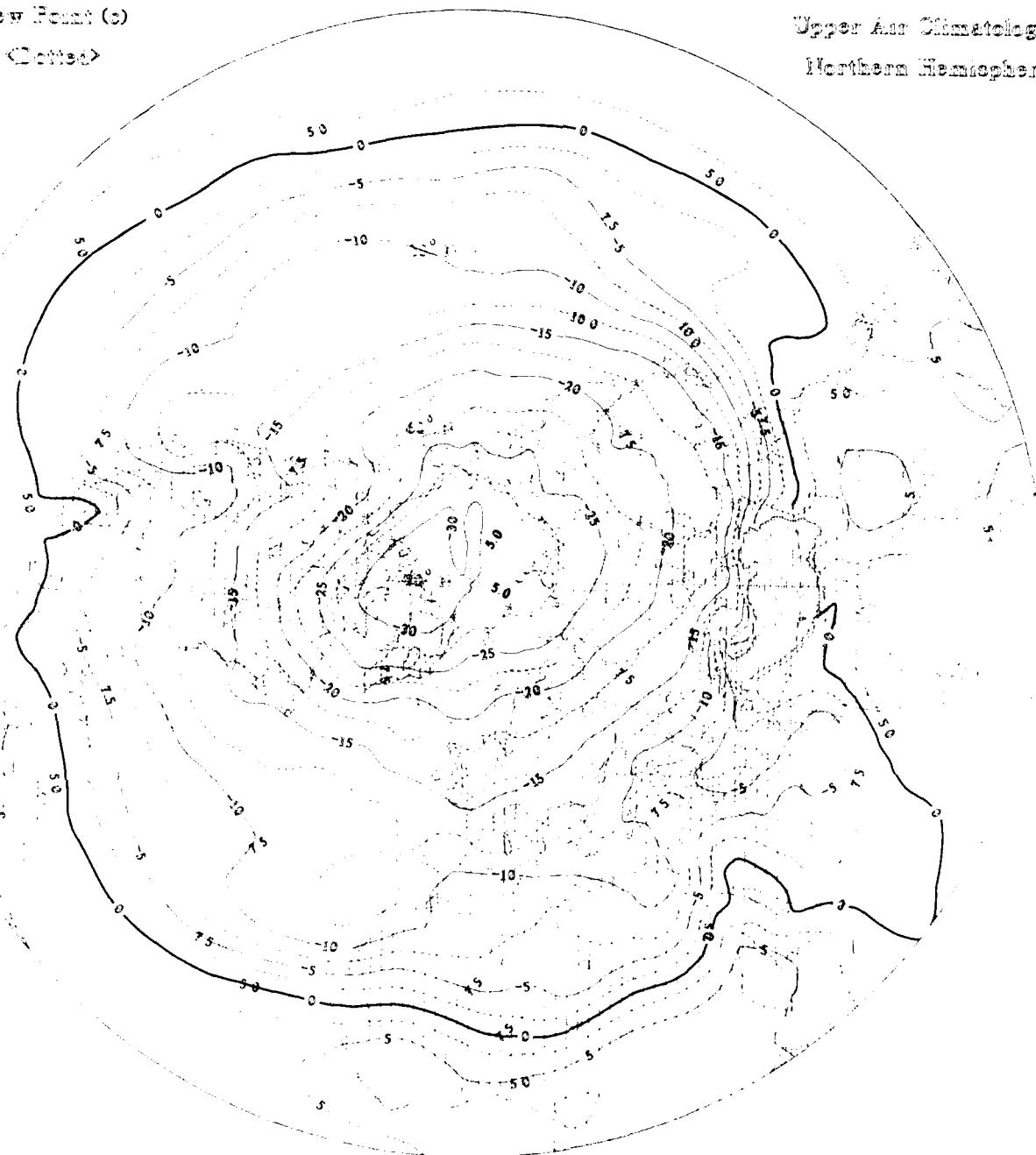
500 mb (Dotted)

400 mb

300 mb

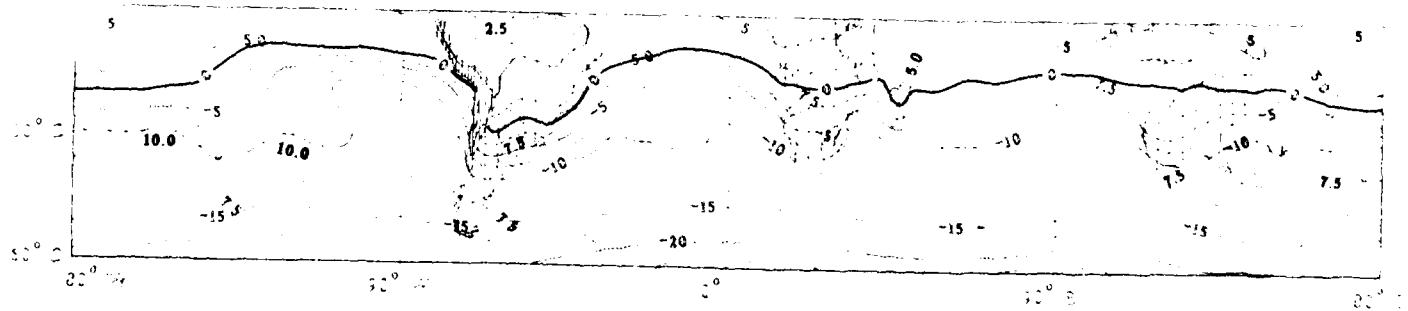
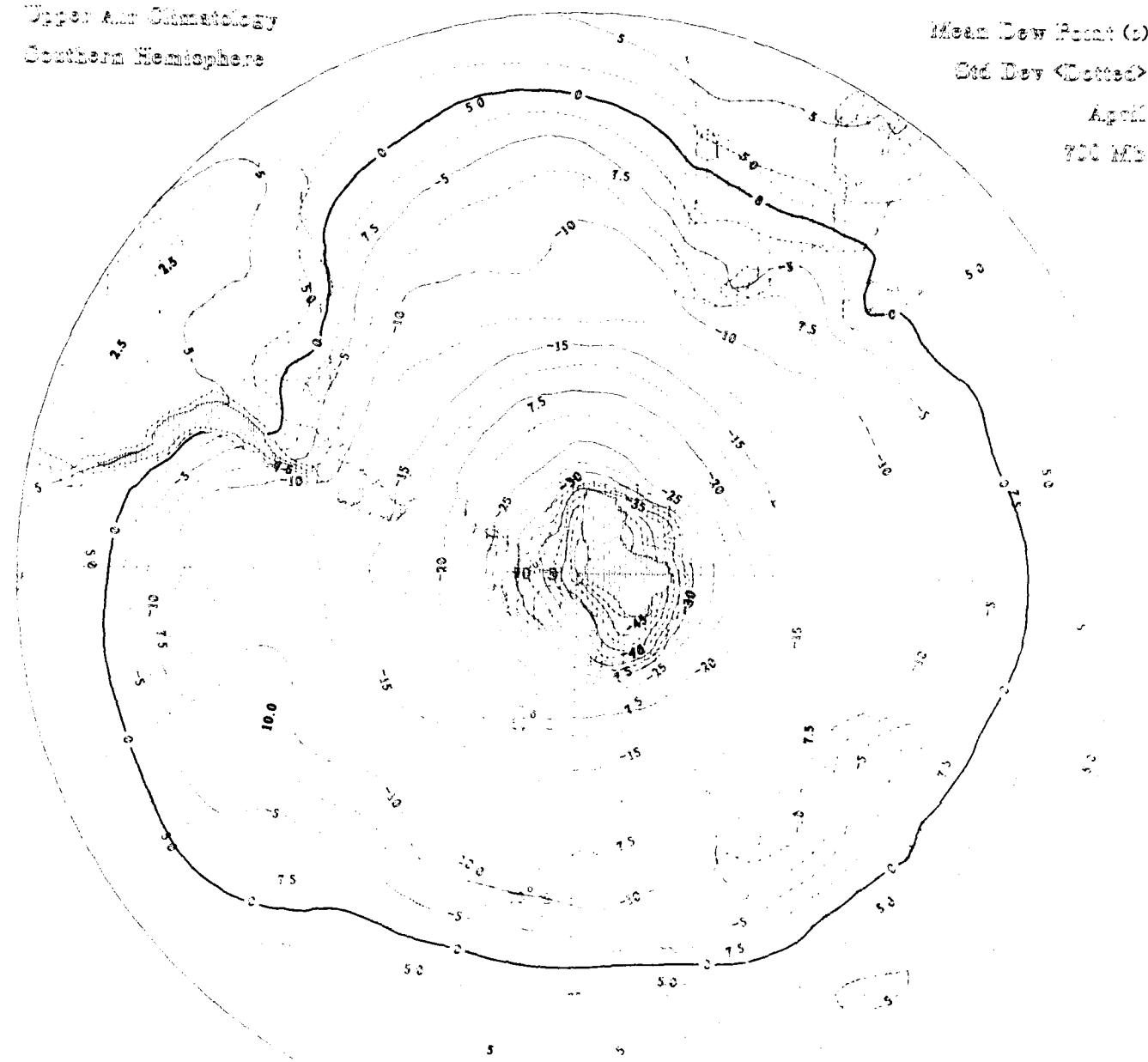
Upper Air Climatology

Northern Hemisphere



Upper Air Climatology
Northern Hemisphere

Mean Dew Point (°)
Std Dev < Dotted >
April
700 MB



Mean Dew Point (c)

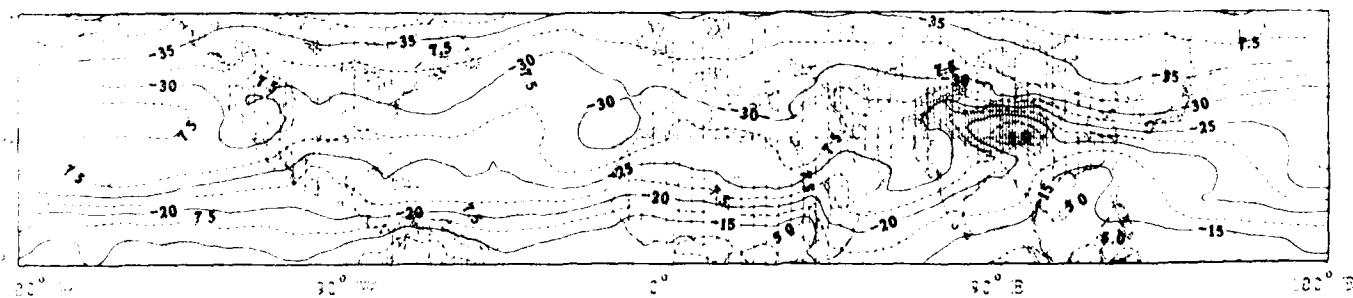
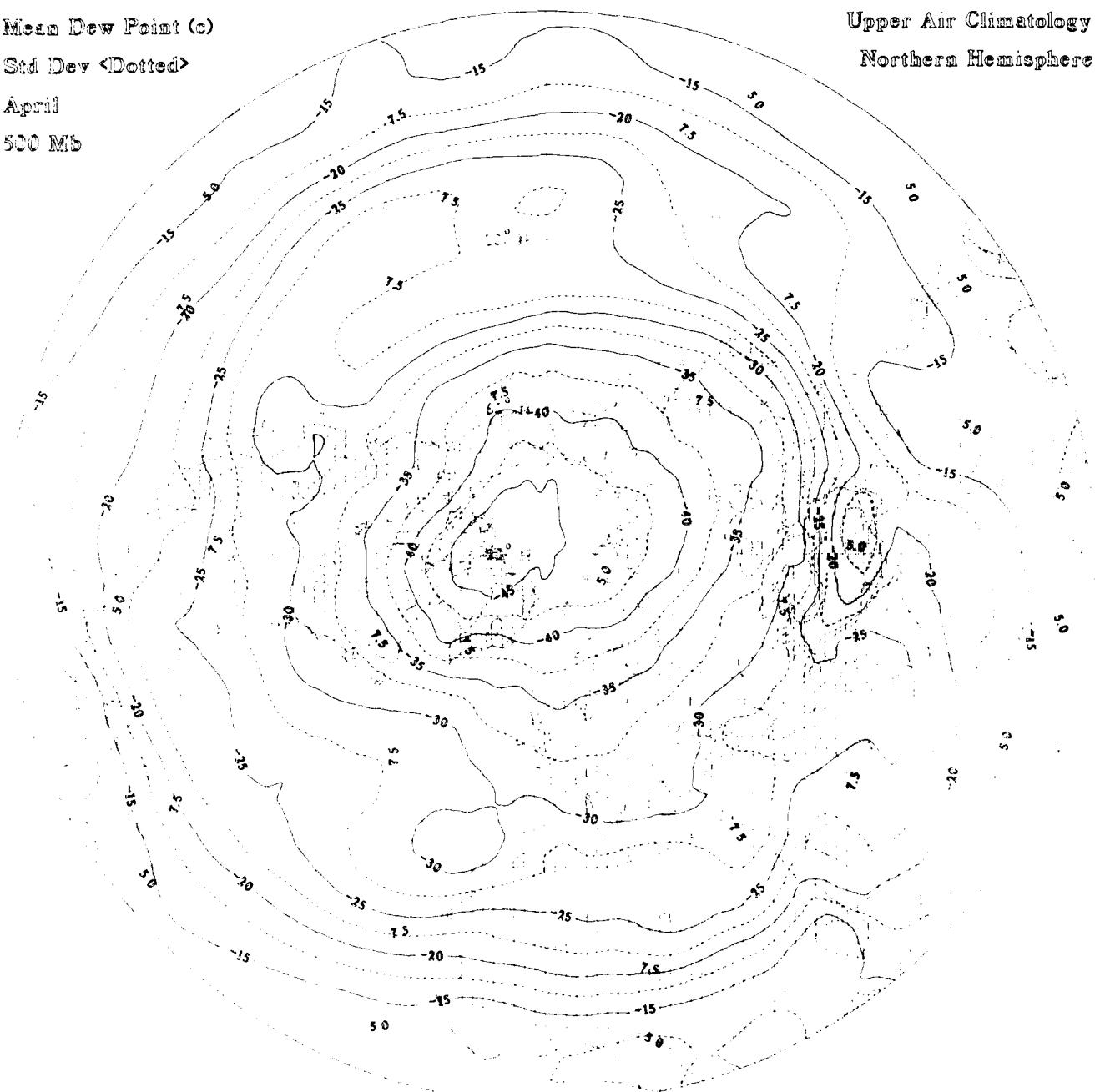
Std Dev < Dotted >

April

500 Mb

Upper Air Climatology

Northern Hemisphere



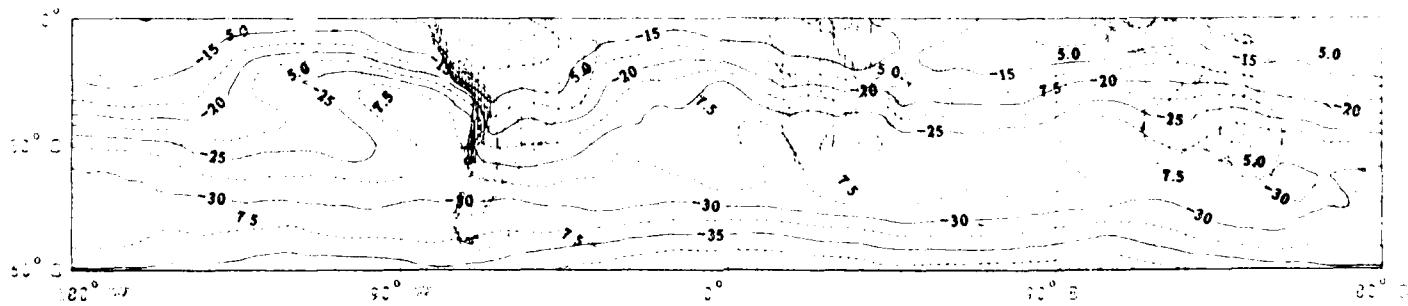
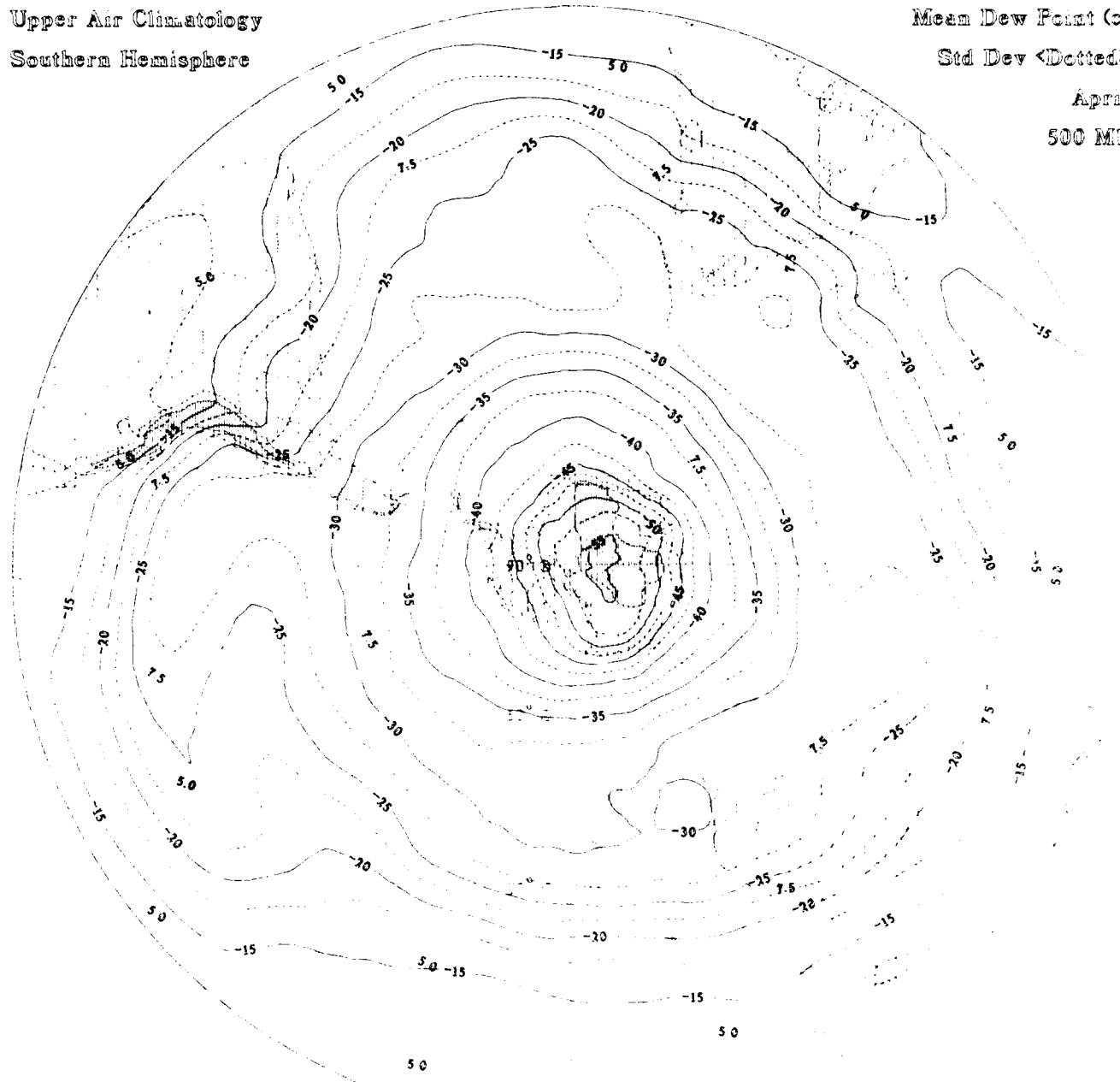
Upper Air Climatology
Southern Hemisphere

Mean Dew Point (°C)

Std Dev < Dotted >

April

500 Mb



Mean Dew Point (c)

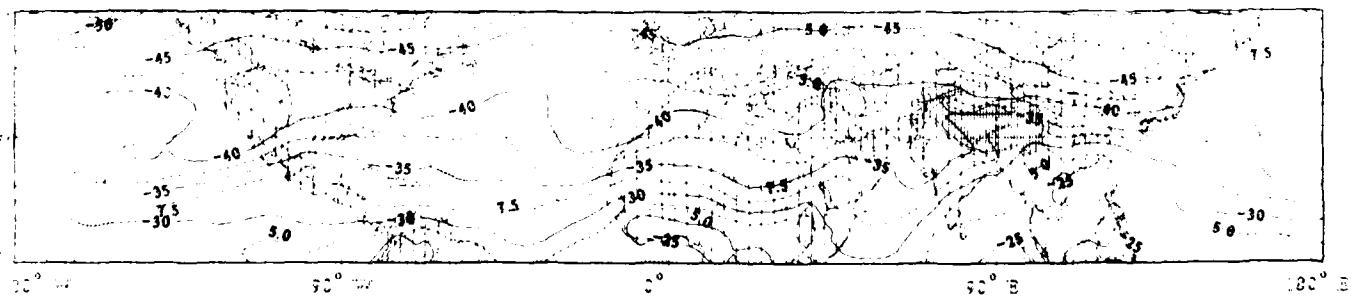
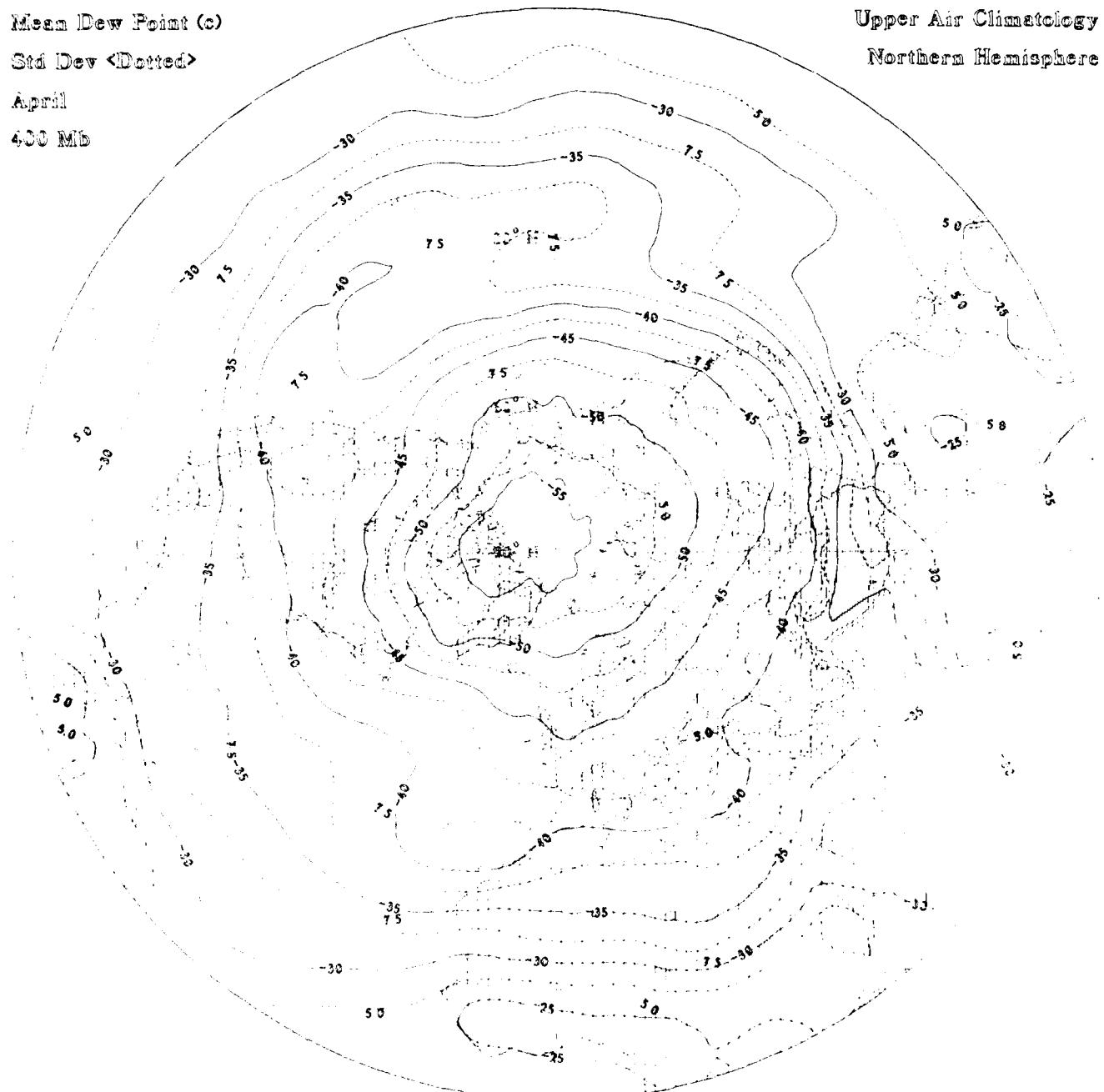
Std Dev < Dotted >

April

400 Mb

Upper Air Climatology

Northern Hemisphere



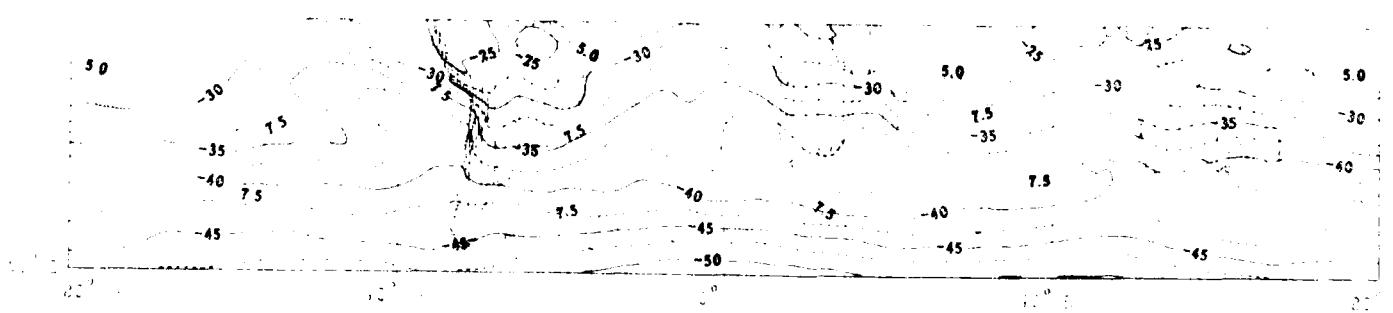
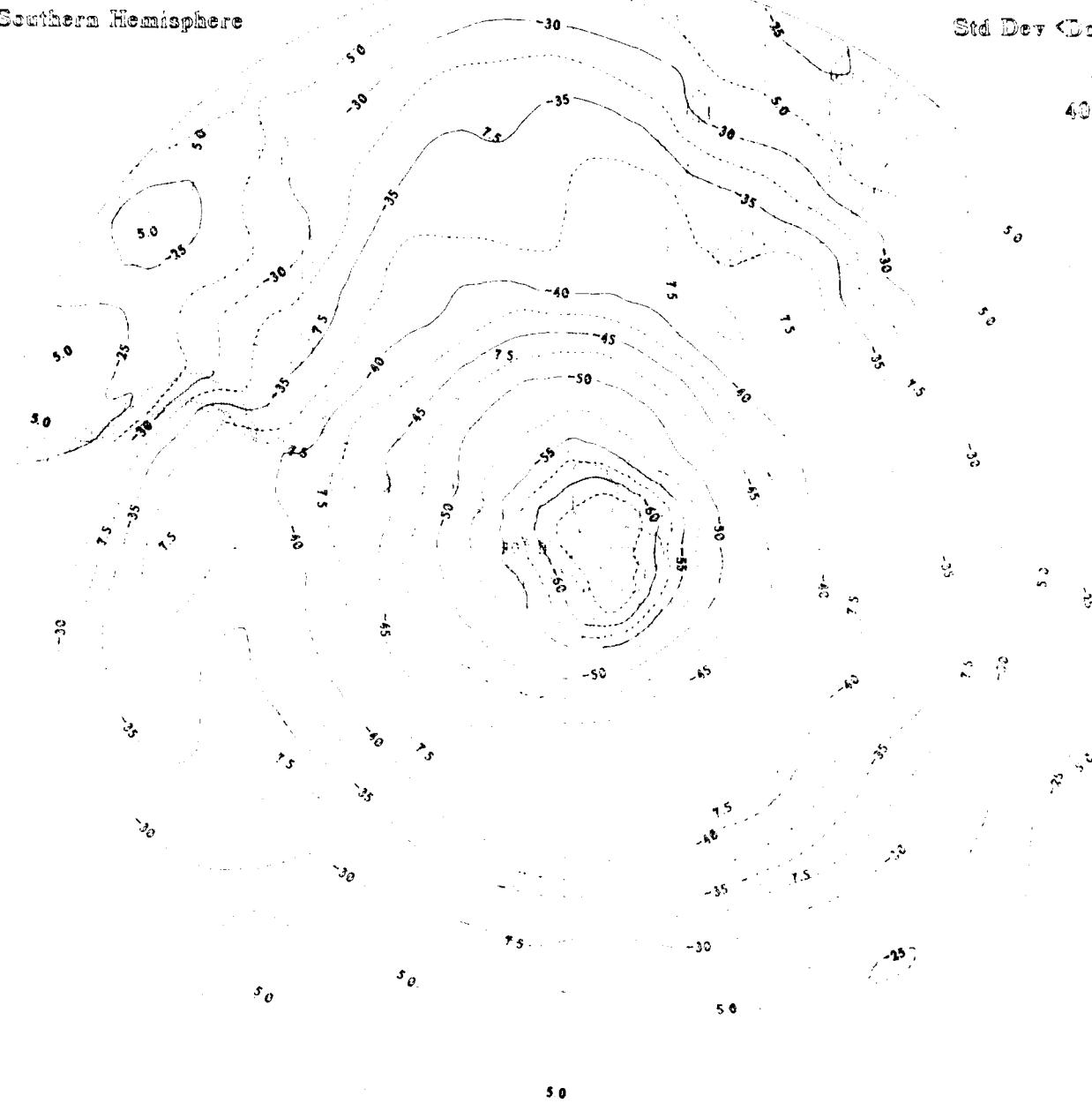
Upper Air Climatology
Southern Hemisphere

Mean Dew Point (°)

Std Dev < Dotted >

April

400 MB



Mean Dew Point (c)

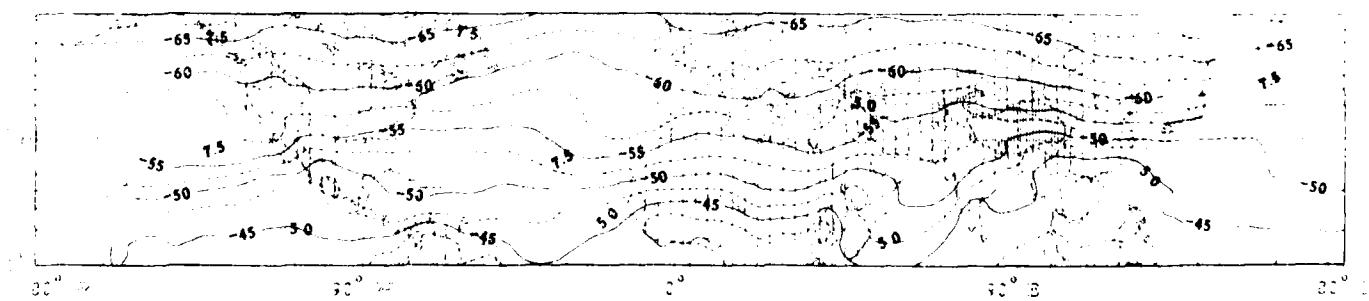
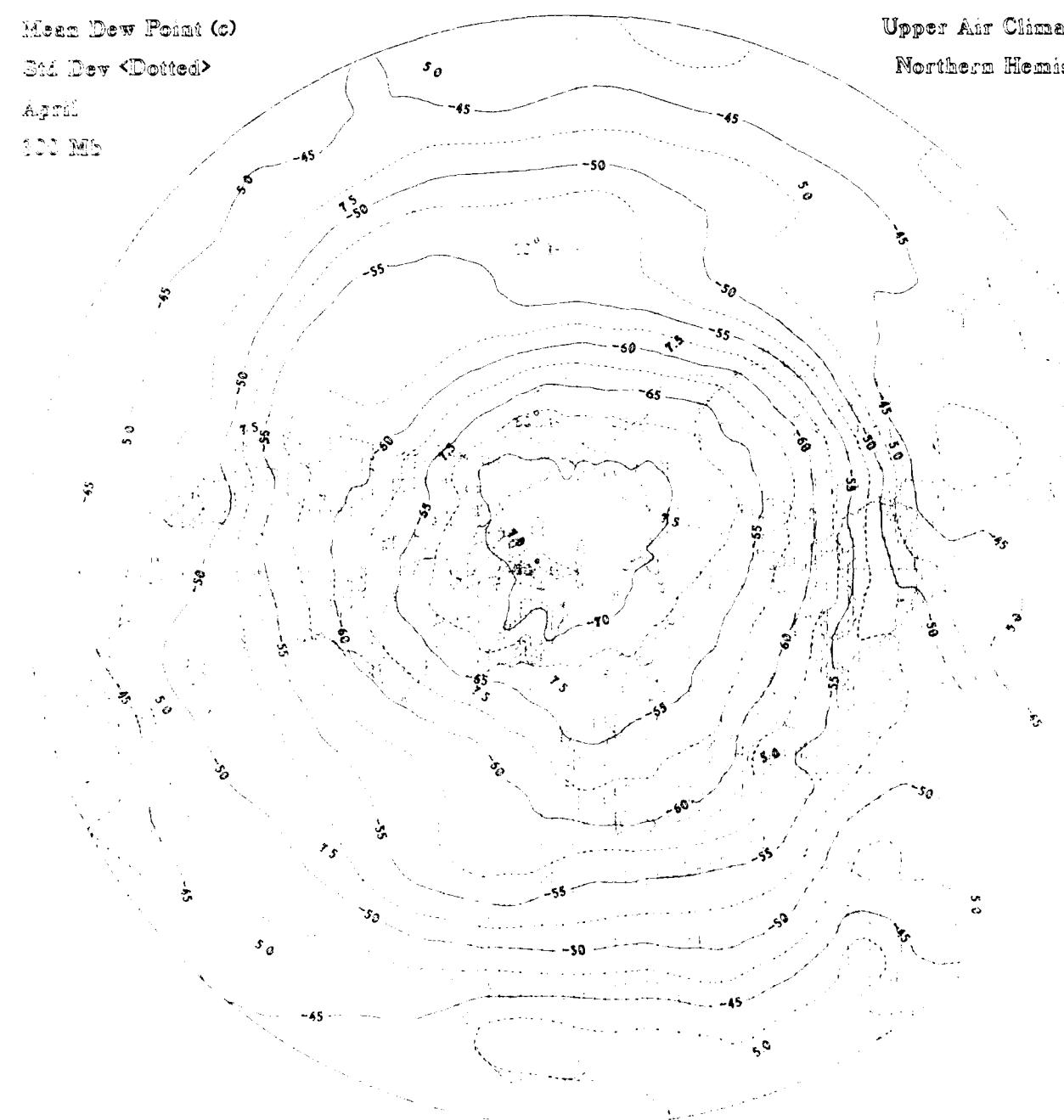
Std. Dev < Dotted >

April

1000 MB

Upper Air Climatology

Northern Hemisphere



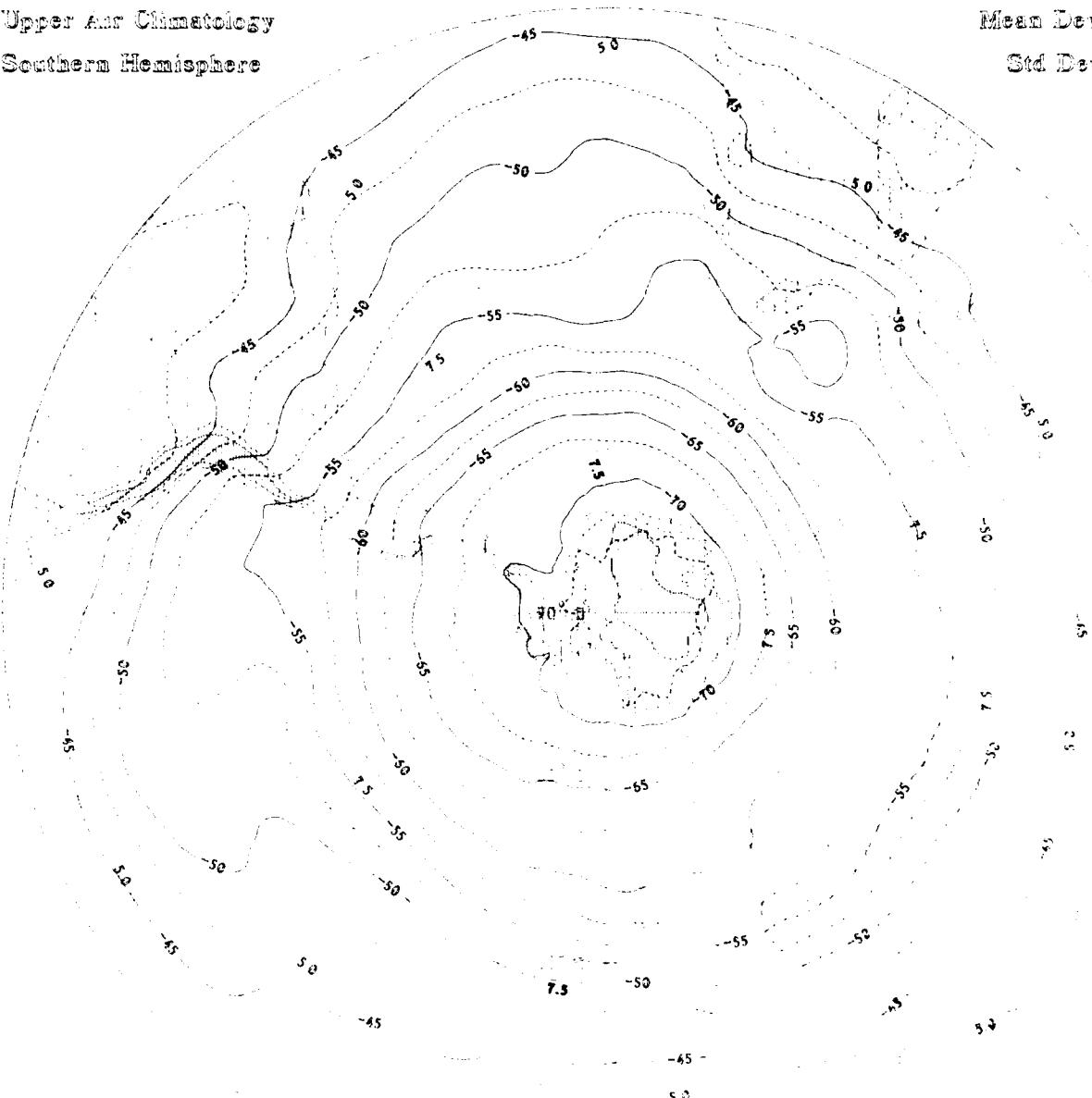
Upper Air Climatology
Southern Hemisphere

Mean Dew Point (°)

Std Dev (Dotted)

April

1950-1951



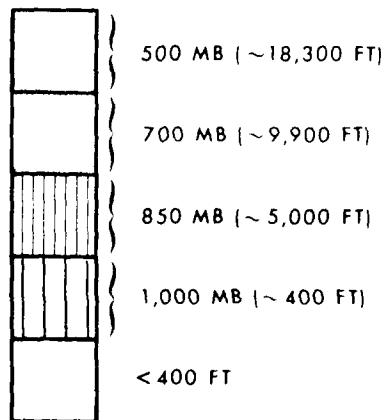
DENSITY
(13 LEVELS, 1000 TO 30 MB)

- Contours of mean density (solid and dashed lines) in kilograms/cubic meter: solids labeled, dashed intermediates unlabeled
- Density labeled interval:

.02 kilograms/cubic meter - 1000 MB to 400 MB
.01 kilograms/cubic meter - 300 MB to 200 MB
.006 kilograms/cubic meter - 150 MB to 30 MB
- Contours of standard deviation of density (dotted lines) in kilograms/cubic meter
- Standard deviation of density labeled interval:

.01 kilograms/cubic meter - 1000 MB to 400 MB
.005 kilograms/cubic meter - 300 MB to 200 MB
.003 kilograms/cubic meter - 150 MB to 30 MB
- Contours blanked for geographic areas with elevations exceeding specified geopotential heights

ELEVATION SCALE

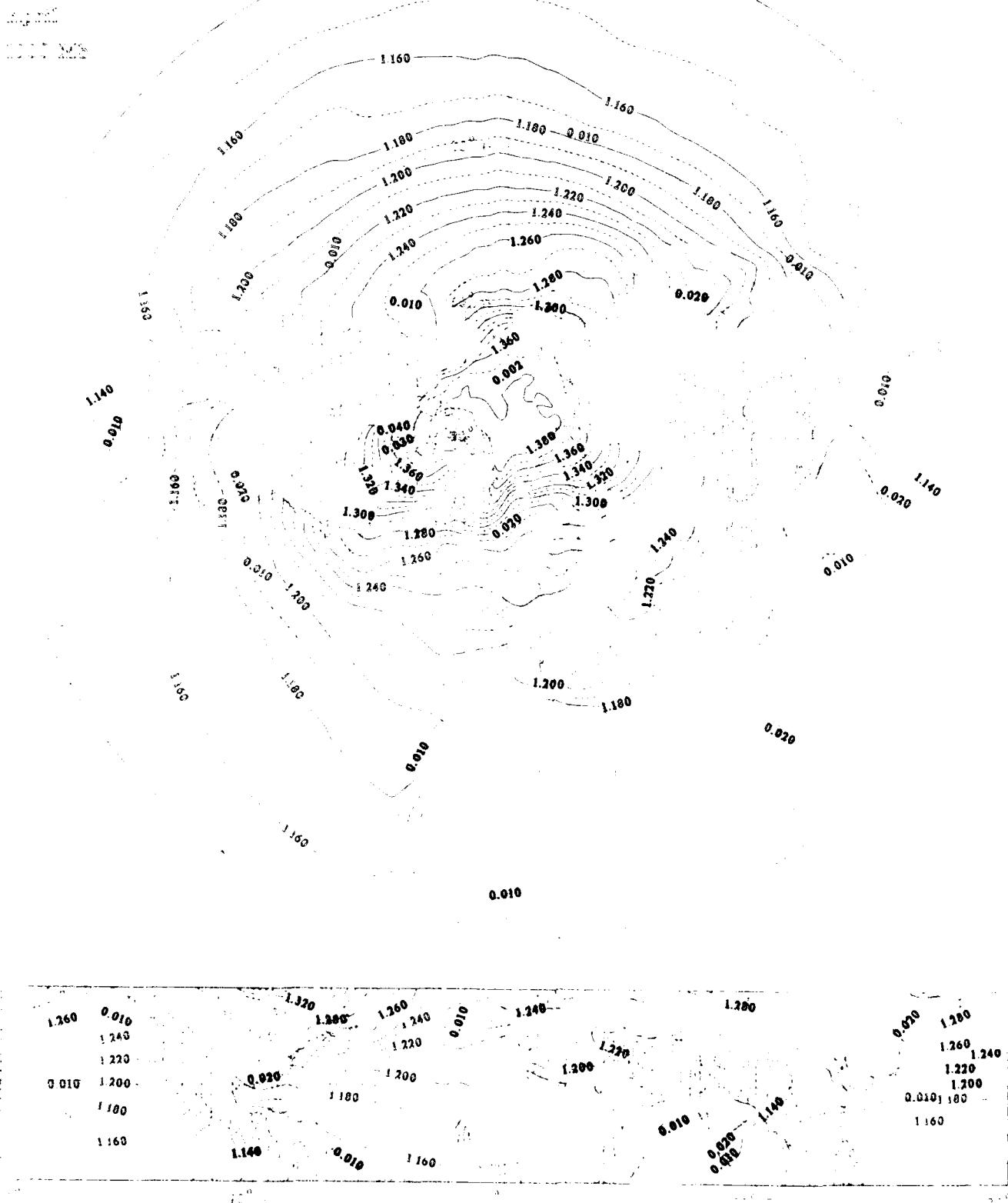


Mean Density (kg/m^3)

Old New Dotted

Upper Air Climatology

Northern Hemisphere



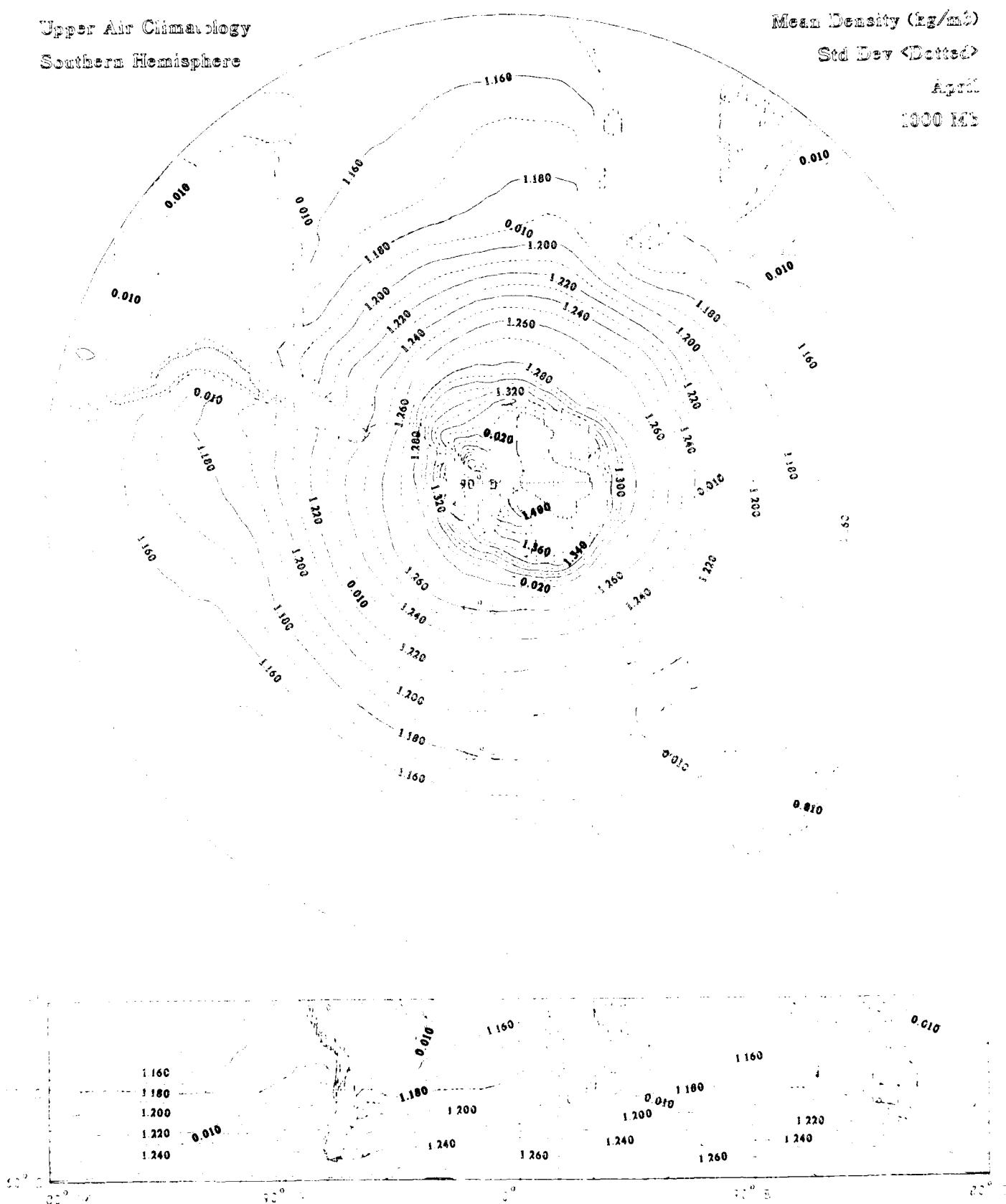
Upper Air Climatology Southern Hemisphere

Mean Density (kg/m³)

Std Dev <Dotted>

三

2000 MB



Mean Mobility (kg/m/s)

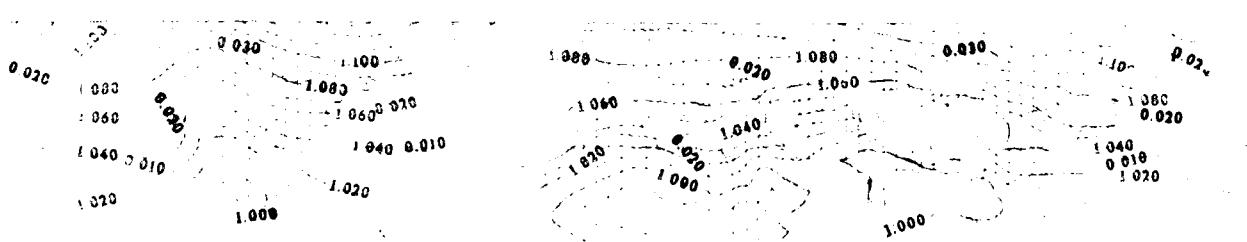
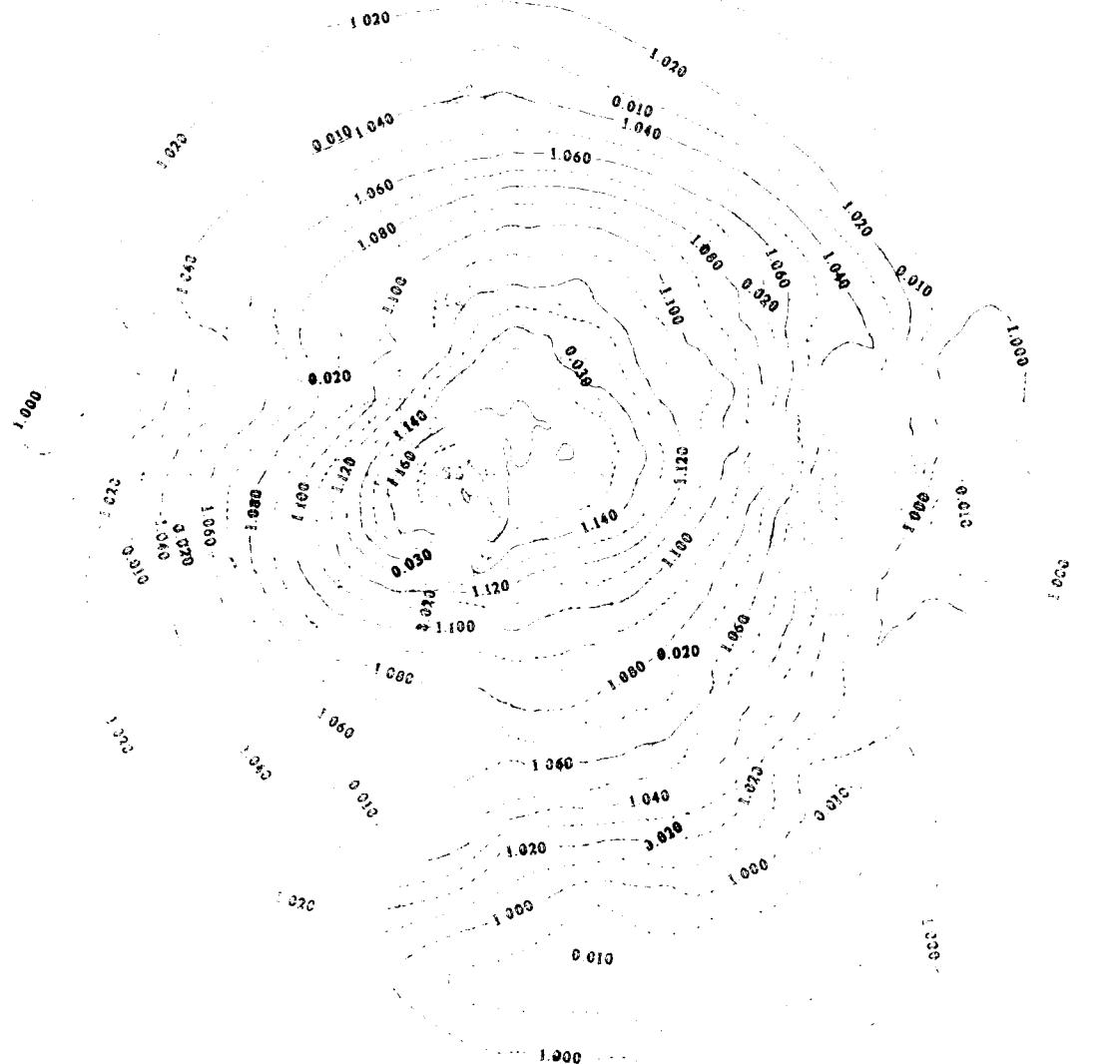
Upper Air Climatology

2021 Dev <Deleted>

Northern Hemisphere

A. S. P. 1900.

292 1922



Report and Bibliography

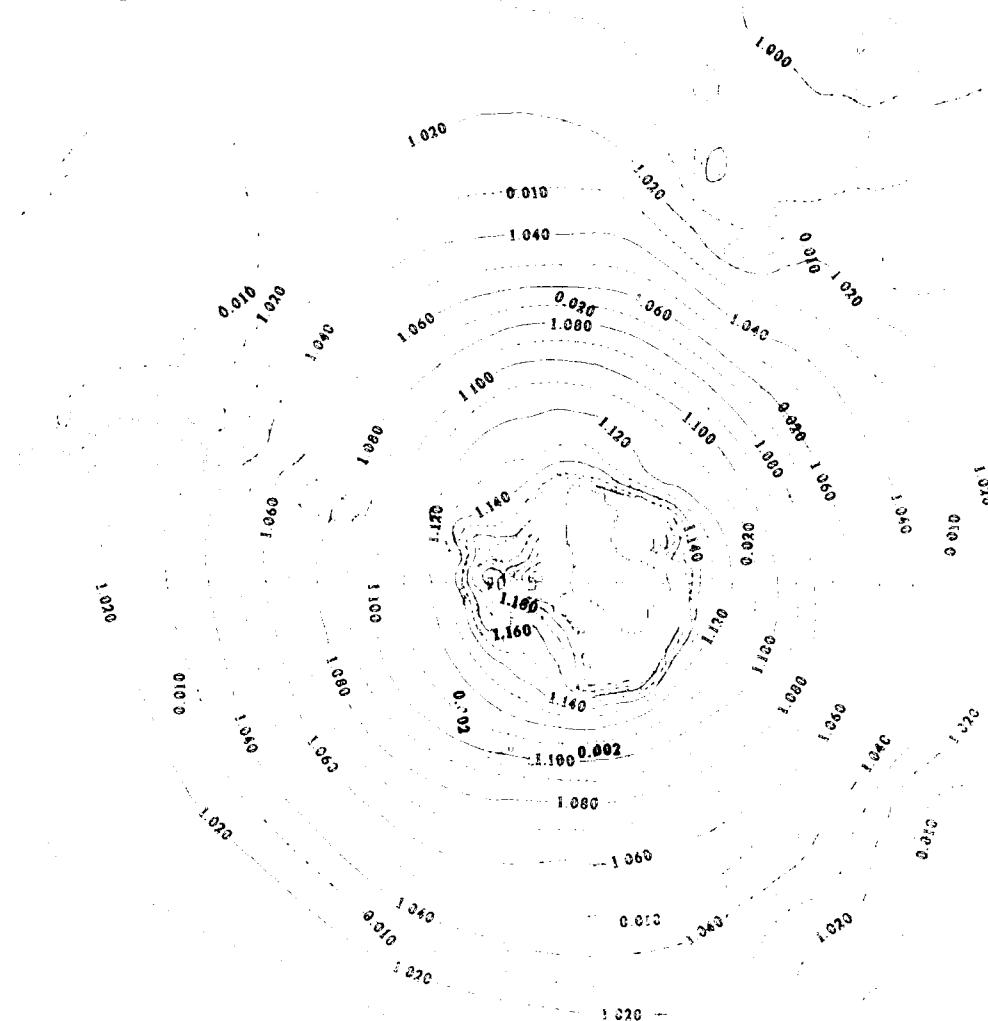
Scandina. Hibernalis.

Mean Density (kg/m³)

Std. Dev. <Boggs>

六三

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1.060
1.080

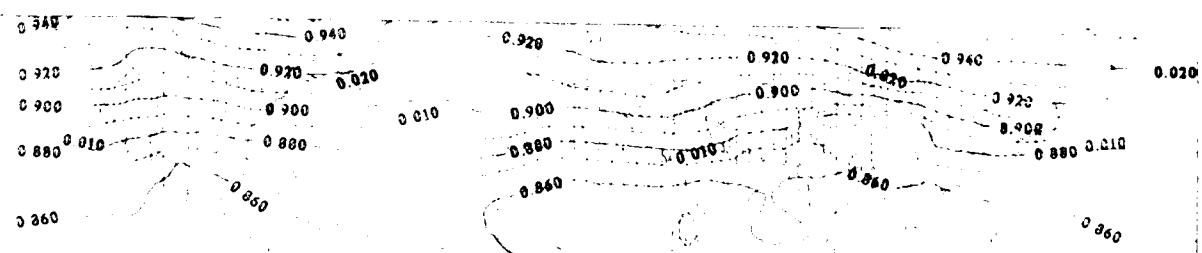
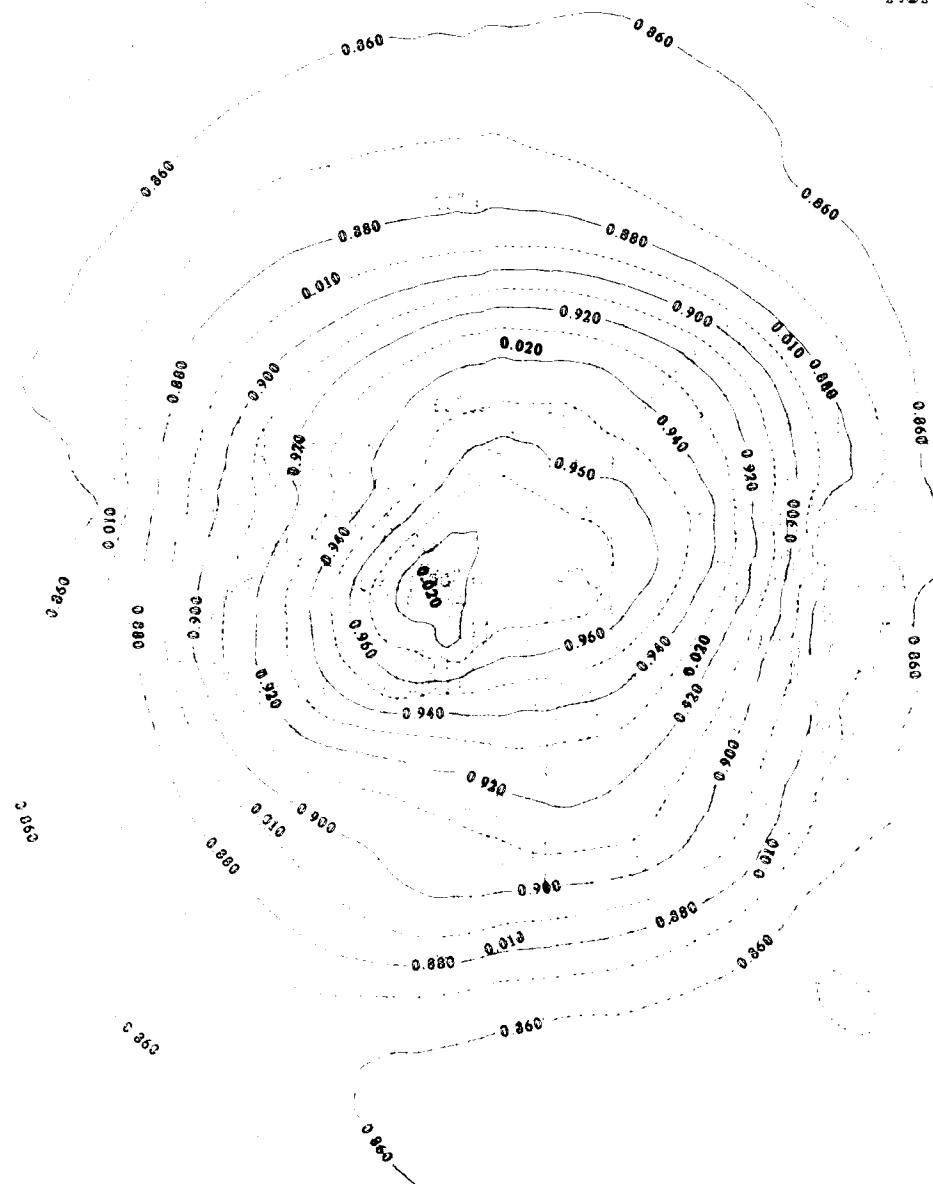
Air Density (kg/m^3)

0.360 < Dotted >

0.360

0.360

Upper Air Climatology
Northern Hemisphere



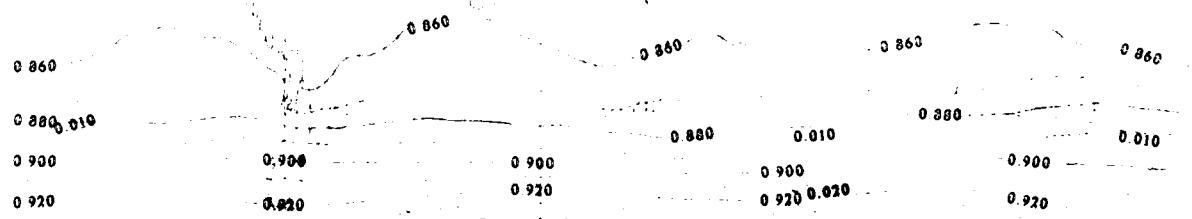
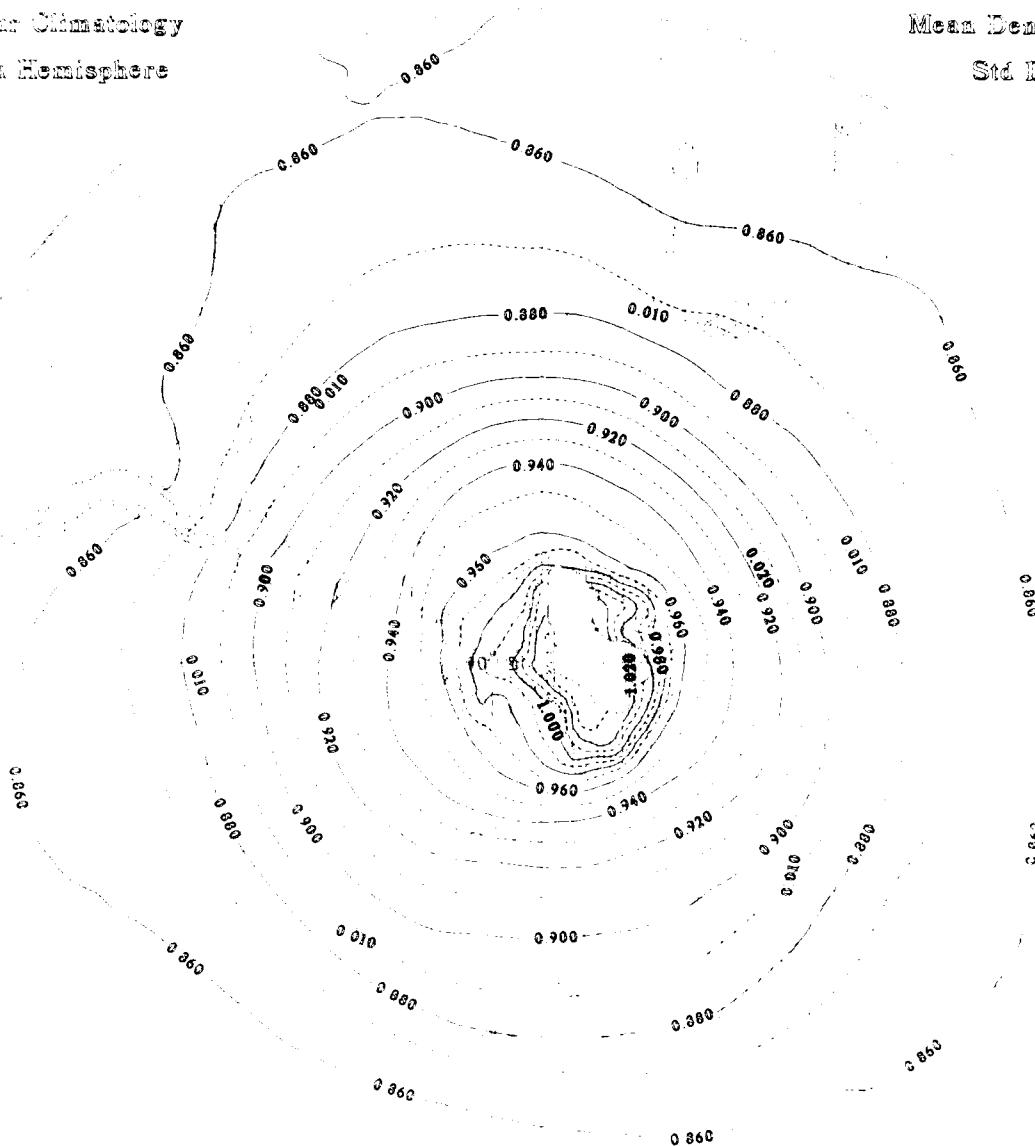
Upper Air Climatology
Southern Hemisphere

Mean Density (kg/m^3)

Std Dev < Dotted >

April

700 MB



Mean Density (kg/m^3)

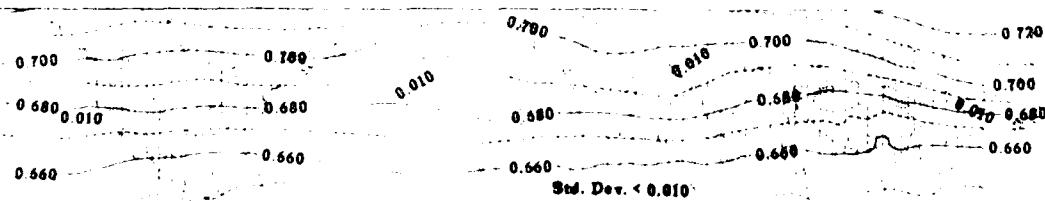
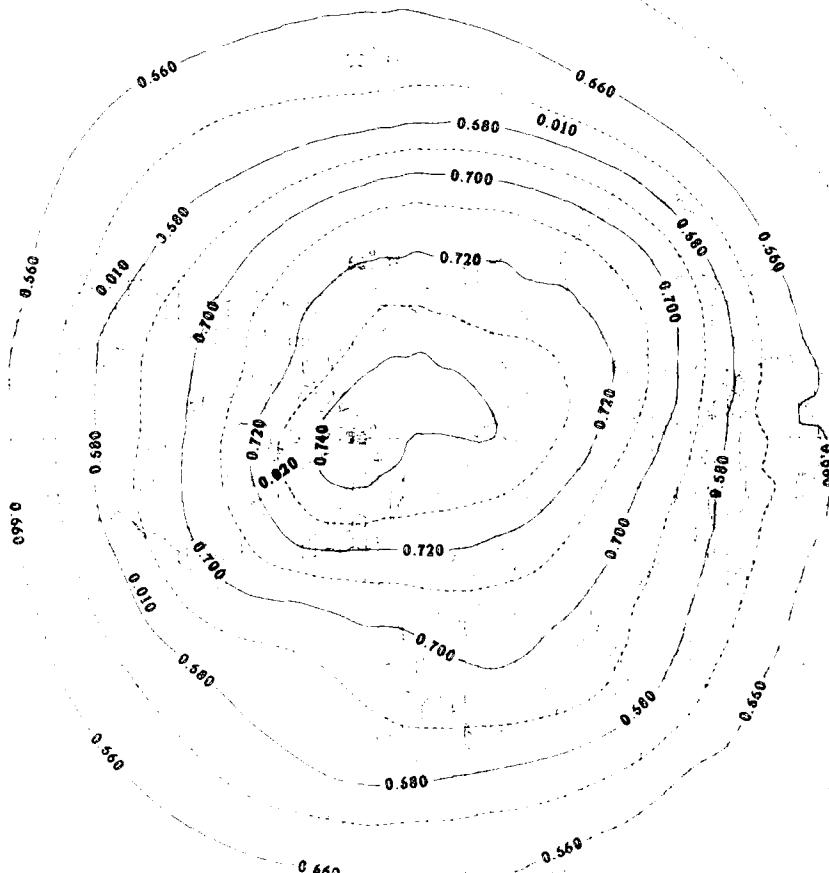
Std Dev < Dotted >

April

0.01 MS

Upper Air Climatology

Northern Hemisphere



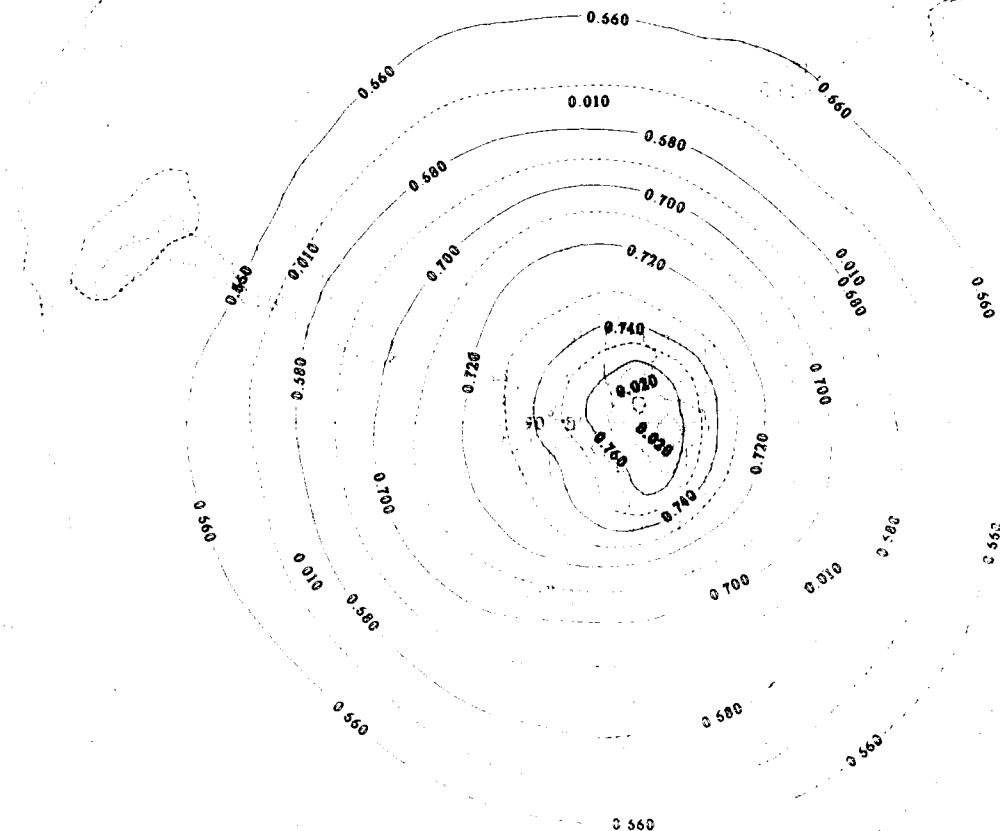
Upper Air Climatology
Southern Hemisphere

Mean Density (kg/m^3)

Std Dev < Dotted >

April

500 Mb



Std. Dev. < 0.010					
0.560	0.660	0.660	0.660	0.660	0.660
0.580	0.680	0.680	0.680	0.680	0.680
0.700	0.780	0.780	0.780	0.780	0.780

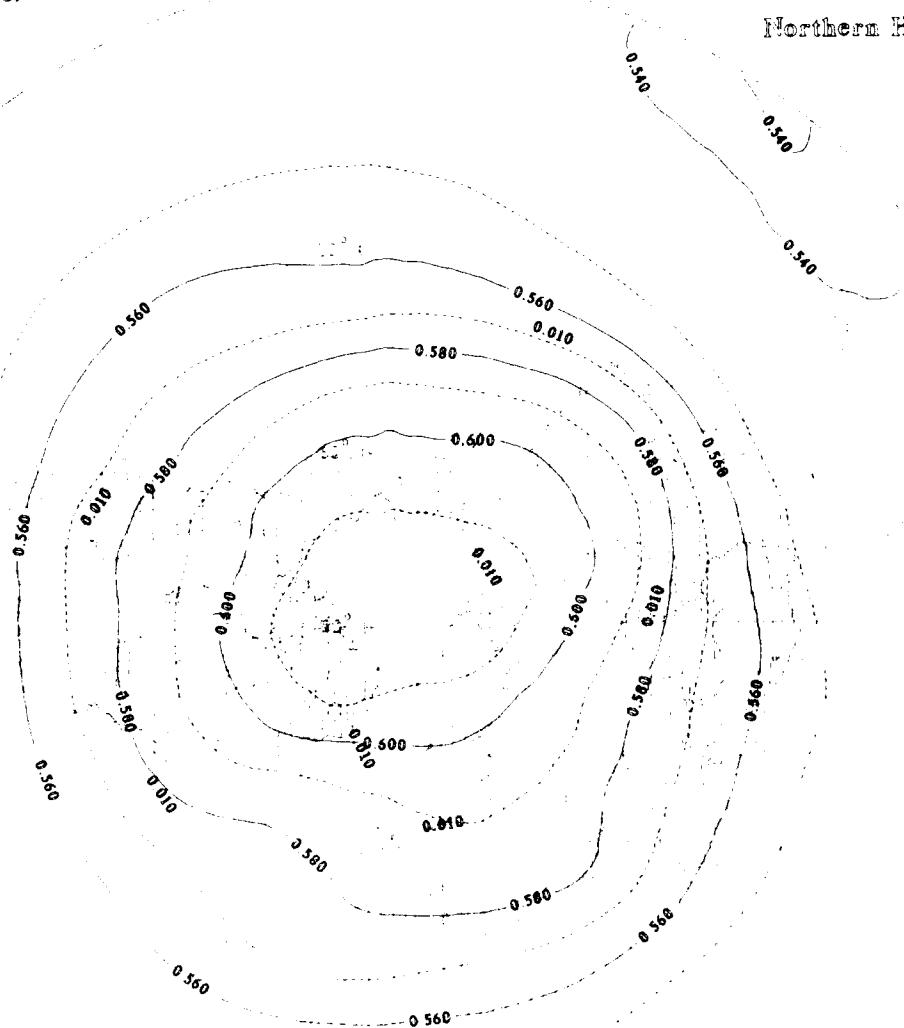
Mean Density (kg/m^3)

Std Dev < Dotted >

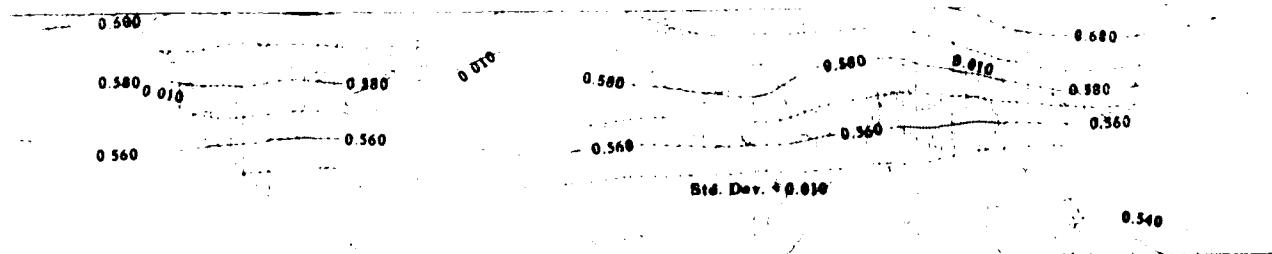
April

400 Mb

Upper Air Climatology
Northern Hemisphere



Std. Dev. < 0.010



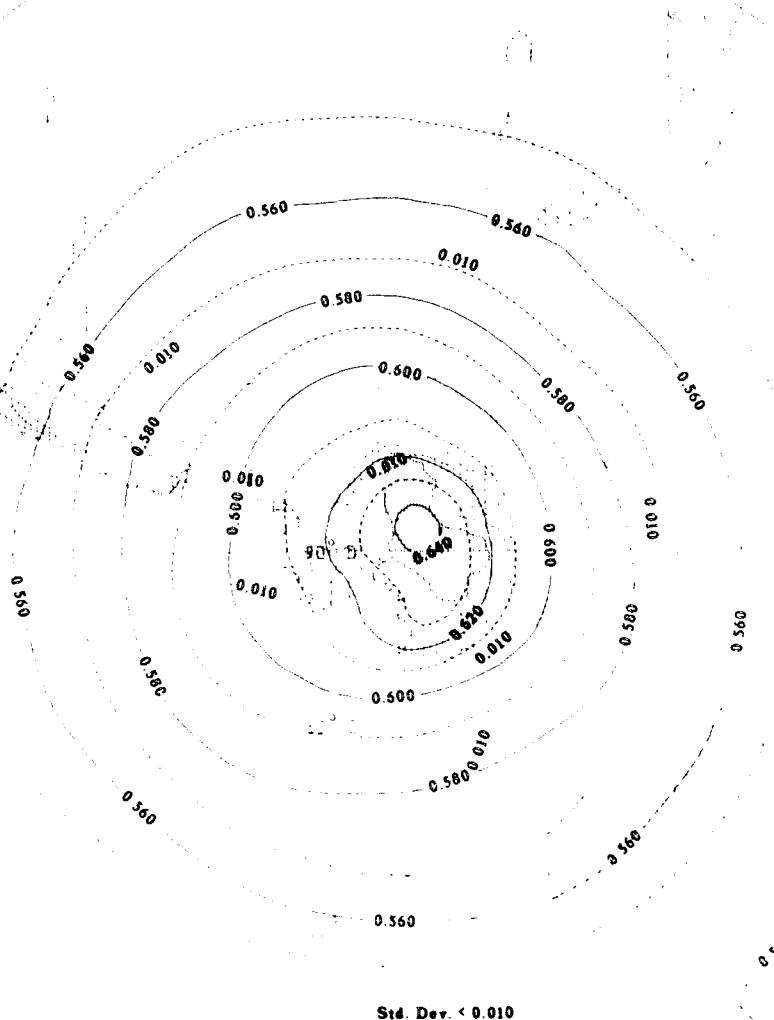
Upper Air Climatology
Southern Hemisphere

Mean Density (kg/m^3)

Std Dev < Dotted >

April

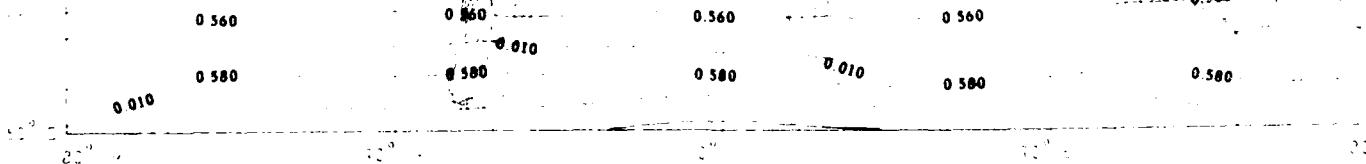
400 MB



Std. Dev. < 0.010

0.540

Std. Dev. < 0.010



Mean Density (kg/m^3)

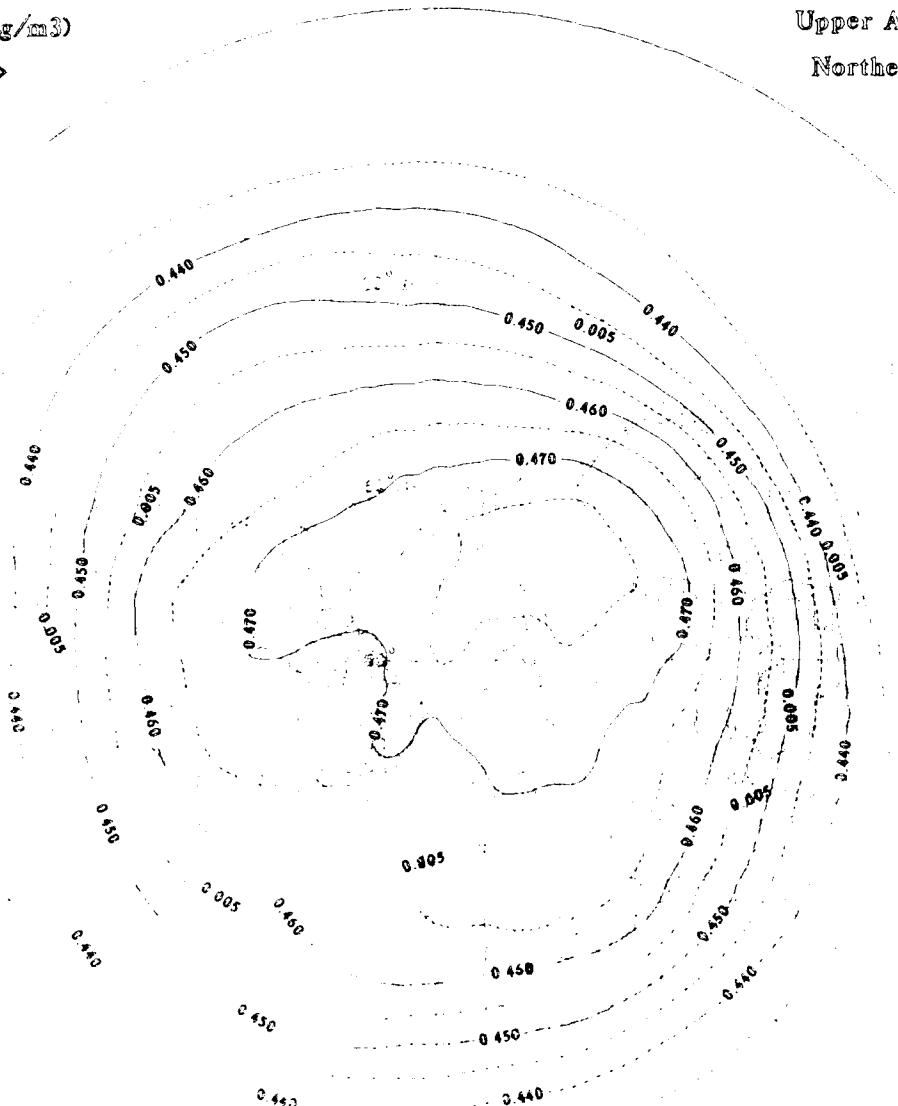
Std Dev < Dotted >

April

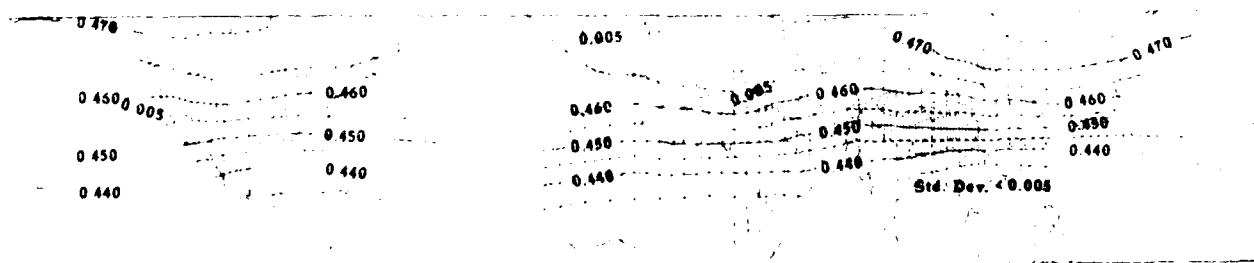
800 MB

Upper Air Climatology

Northern Hemisphere



Std. Dev. < 0.005



Std. Dev. < 0.005

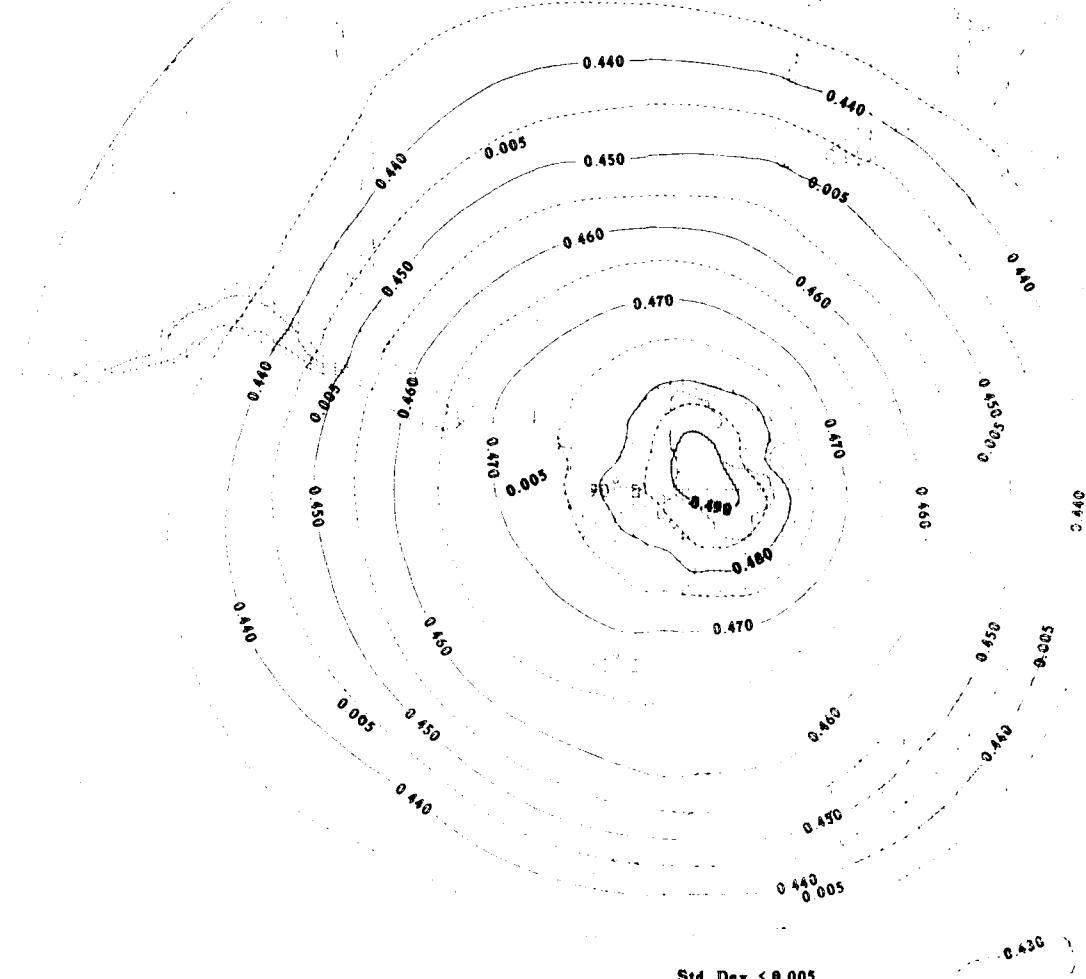
Upper Air Climatology
Southern Hemisphere

Mean Density (kg/m^3)

Std Dev < Dotted >

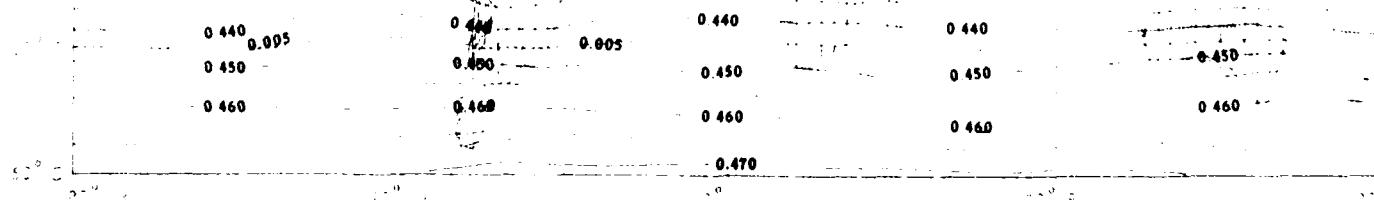
April

300 MB



Std. Dev. < 0.005

Std. Dev. < 0.005



Mean Density (kg/m^3)

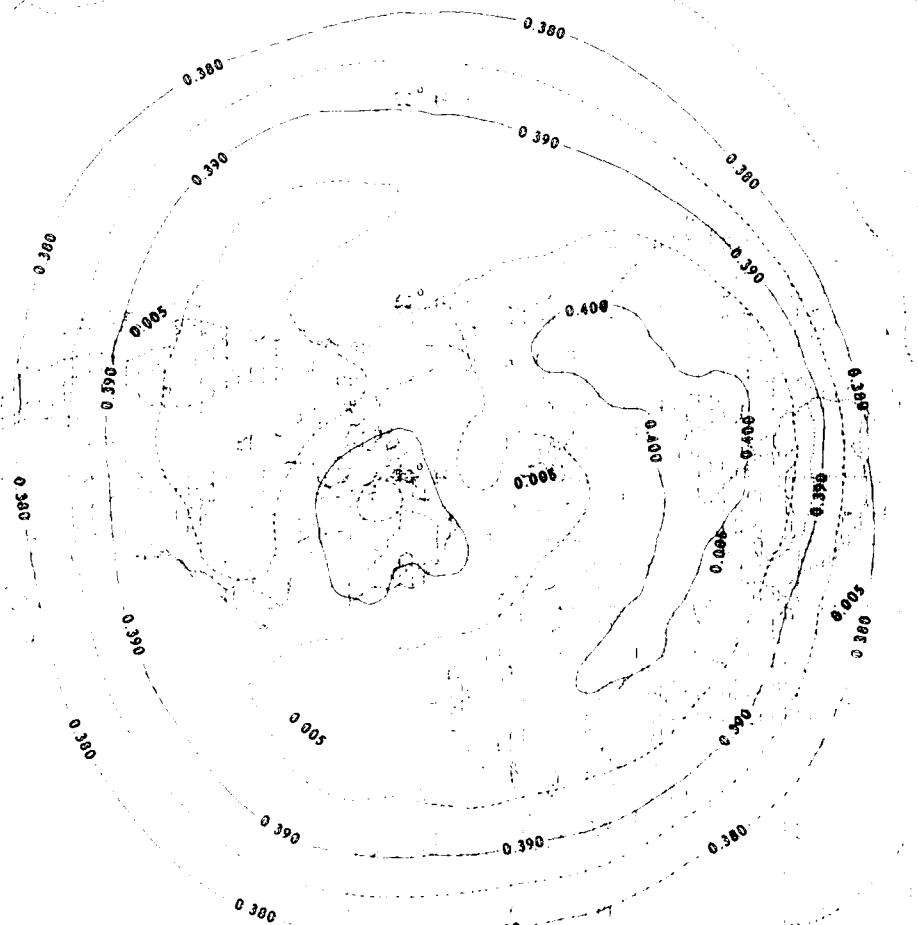
Std Dev < Dotted >

April

850 Mb

Upper Air Climatology

Northern Hemisphere



0.400

0.400

0.390

0.380

Std. Dev. < 0.005

30° W

90° W

0°

90° E

30° E

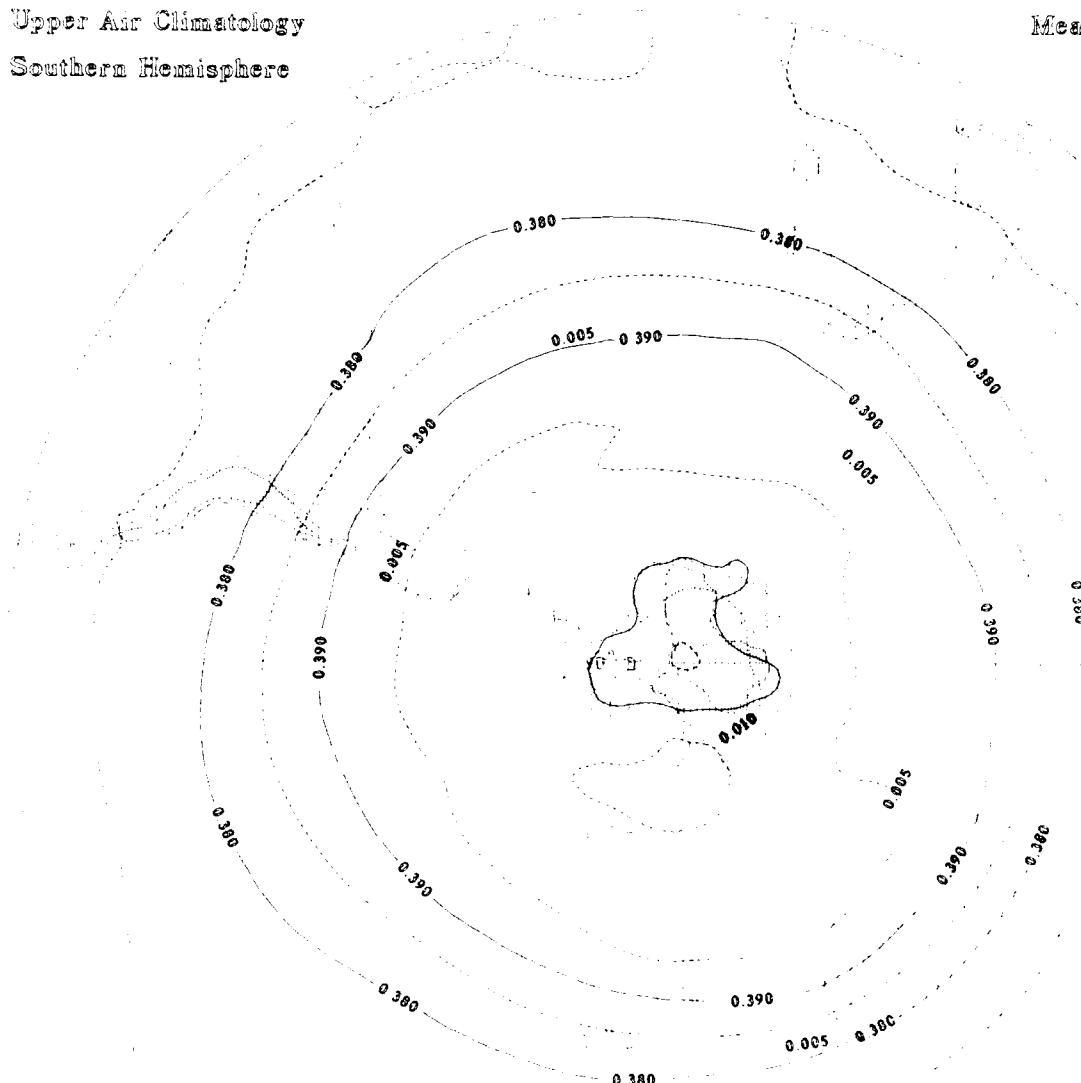
Upper Air Climatology
Southern Hemisphere

Mean Density (kg/m^3)

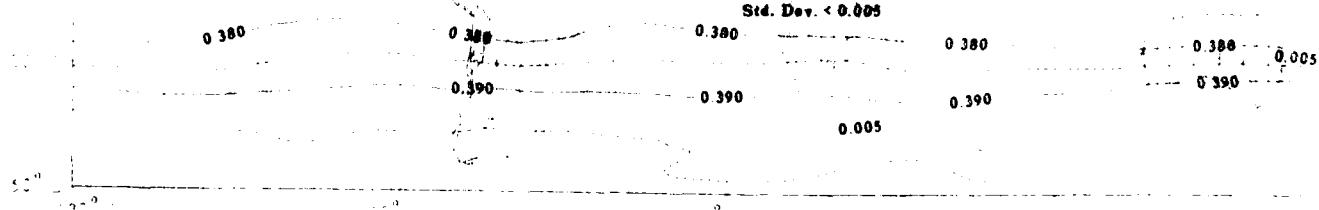
Std Dev < Dotted >

April

250 MB



Std. Dev. < 0.005



Mean Density (kg/m³)

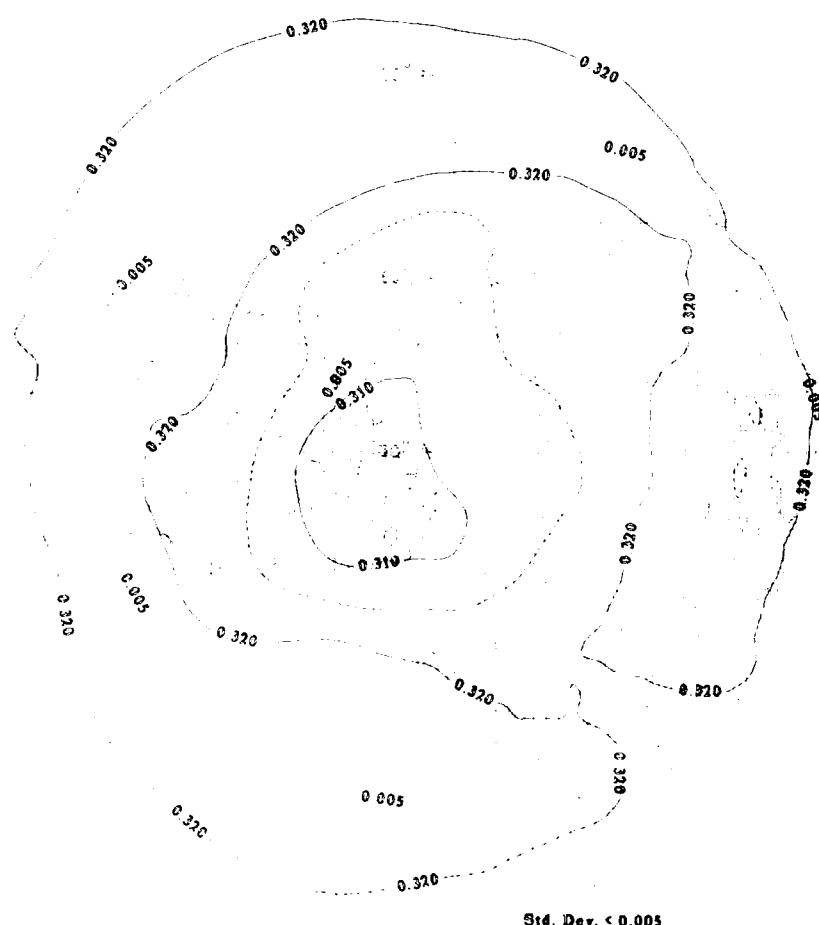
Upper Air Climatology

Std Dev <Dotted>

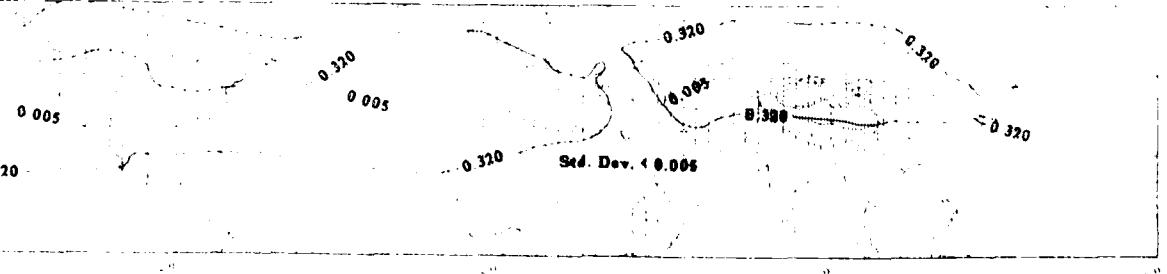
Northern Hemisphere

三

200 Mb



Std. Dev. < 0.005



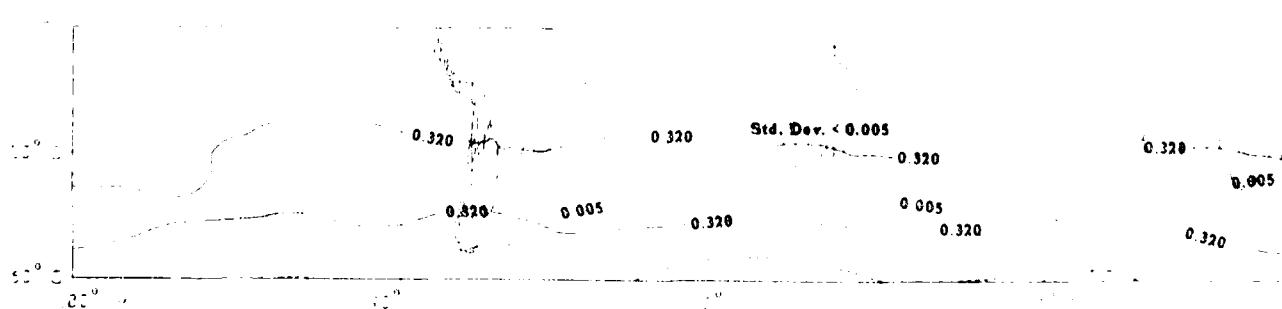
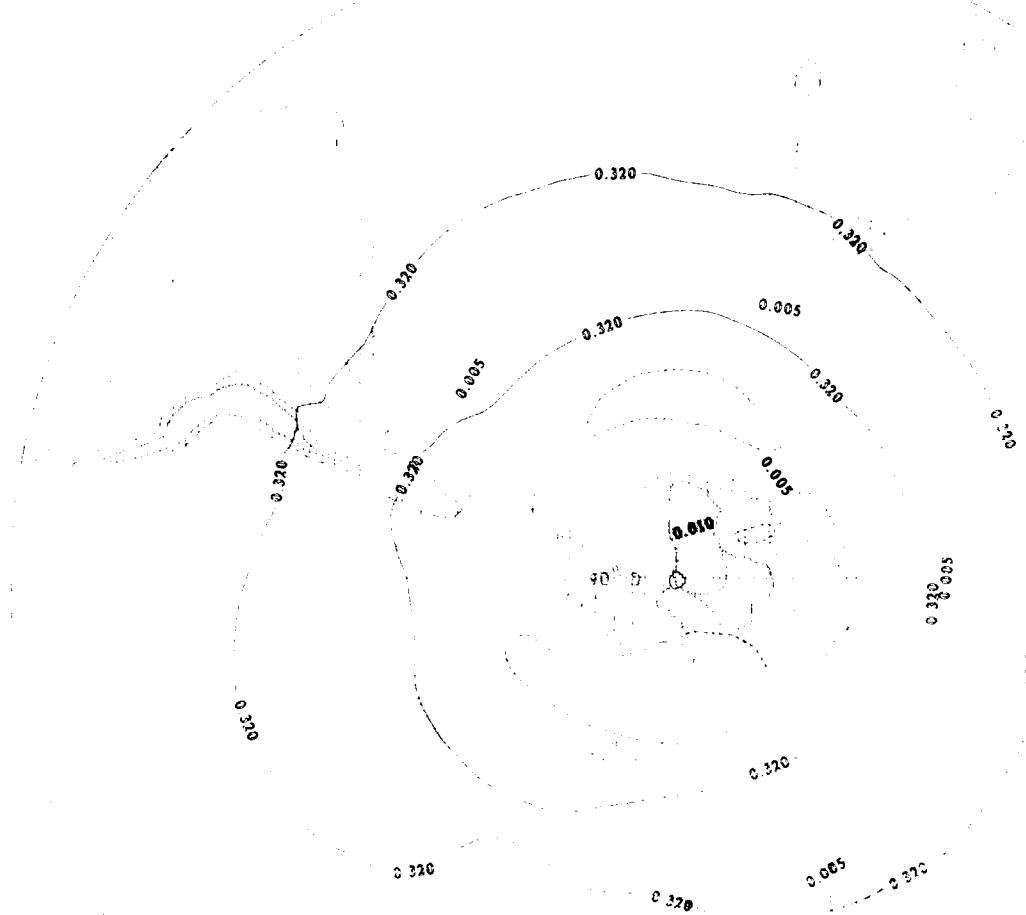
Upper Air Climatology
Southern Hemisphere

Mean Density (kg/m^3)

Std Dev (Dotted)

Avg.

Std Dev



Mean Density (kg/m³)

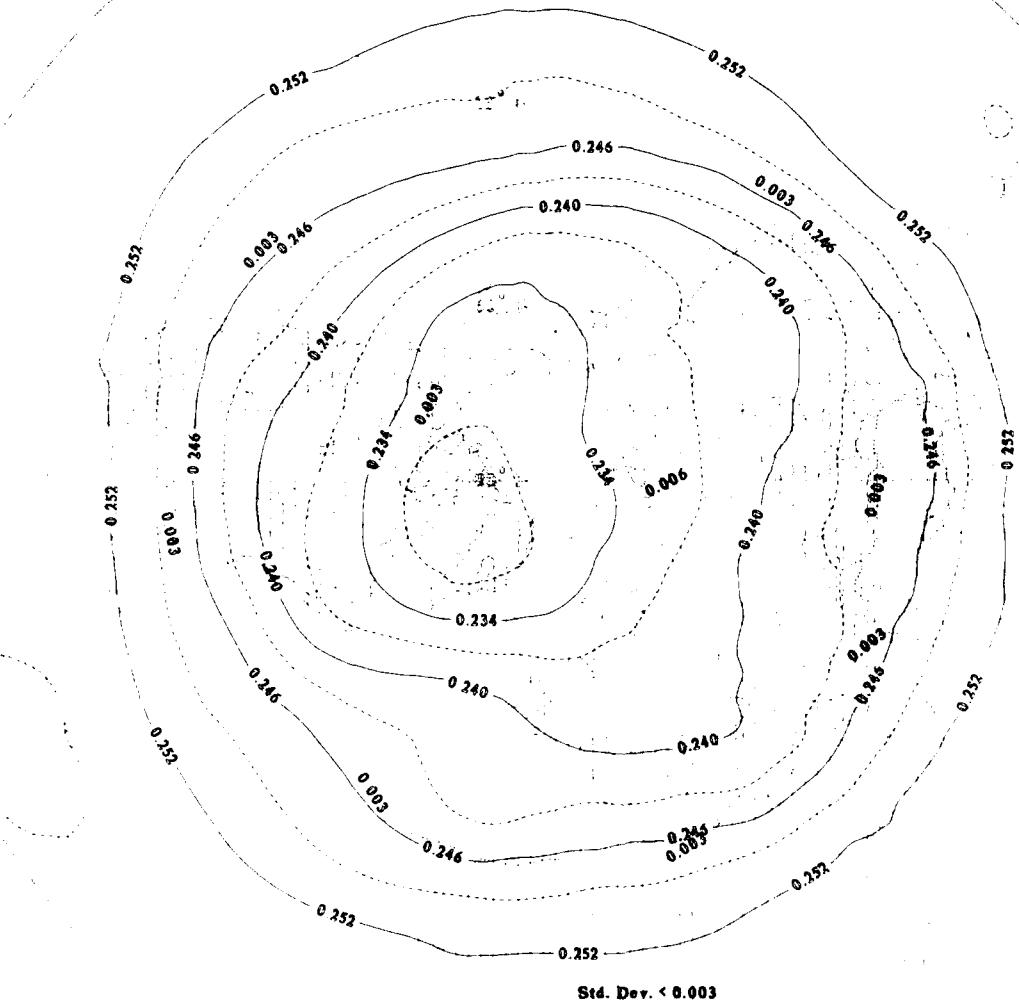
Upper Air Climatology

Northern Hemisphere

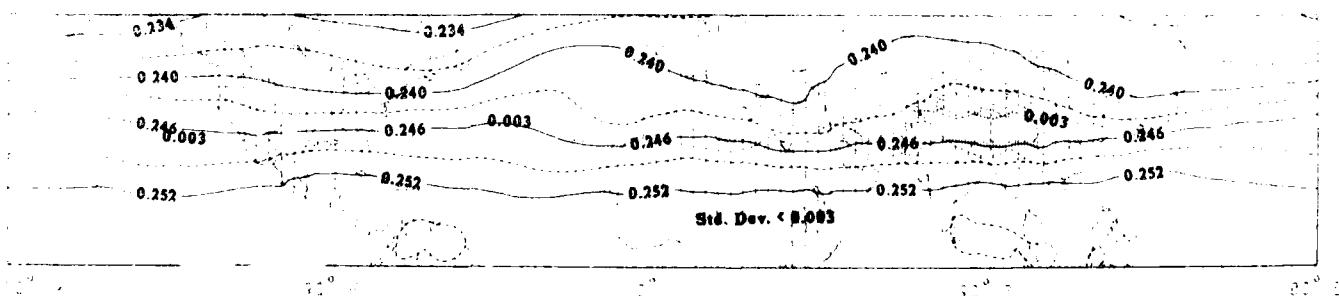
Std Dev <Dotted>

April

150 Mb



Std. Dev. < 0.003



190

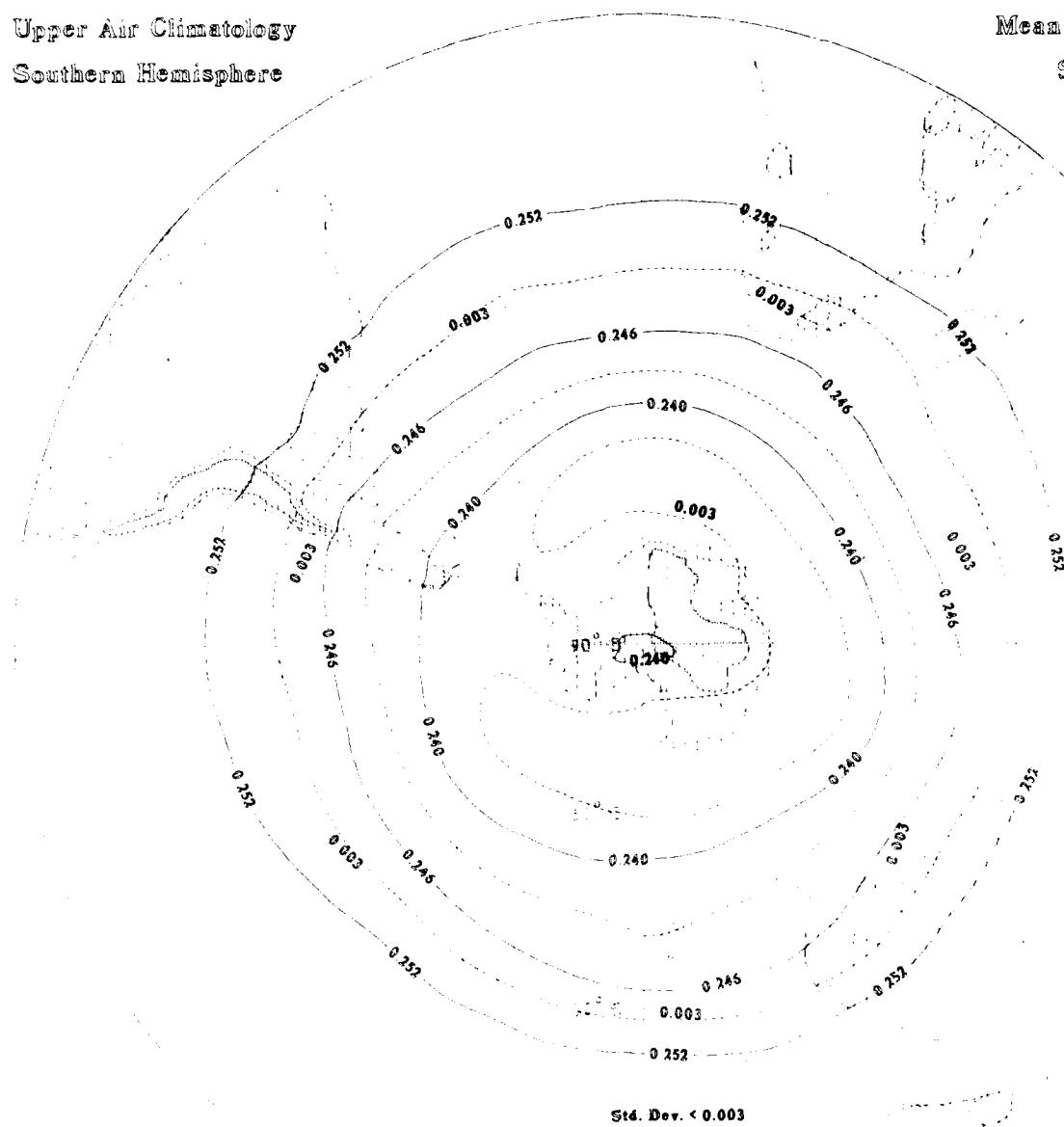
Upper Air Climatology Southern Hemisphere

Mean Density (kg/m³)

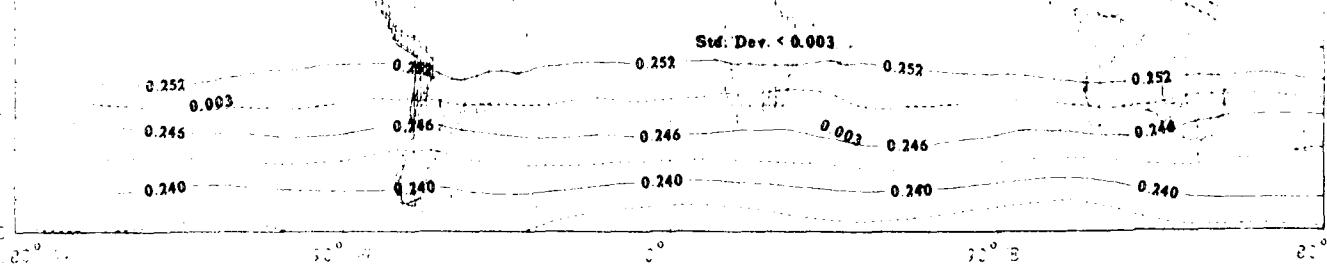
Std Dev <Dotted>

April

150 Mb



Std. Dev. < 0.003



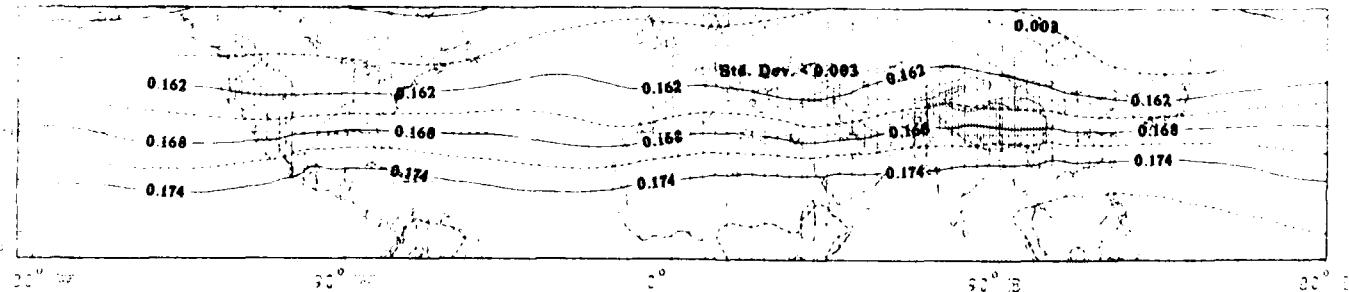
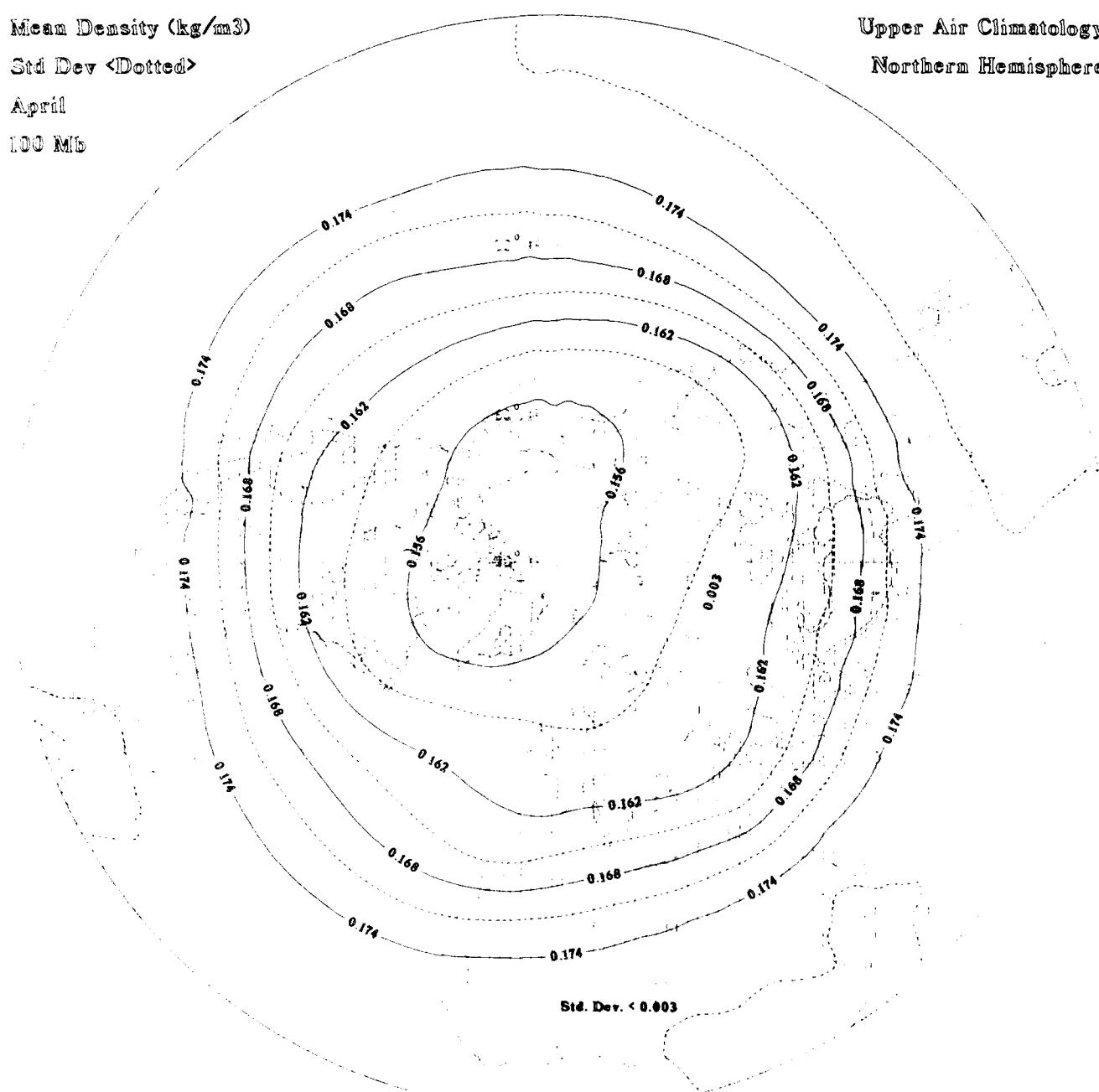
Mean Density (kg/m³)

Std Dev <Dotted>

April

100 Mb

Upper Air Climatology Northern Hemisphere



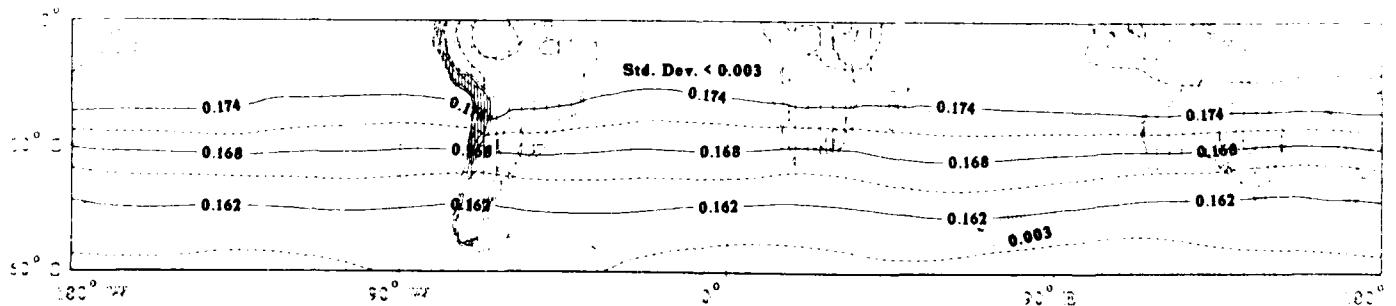
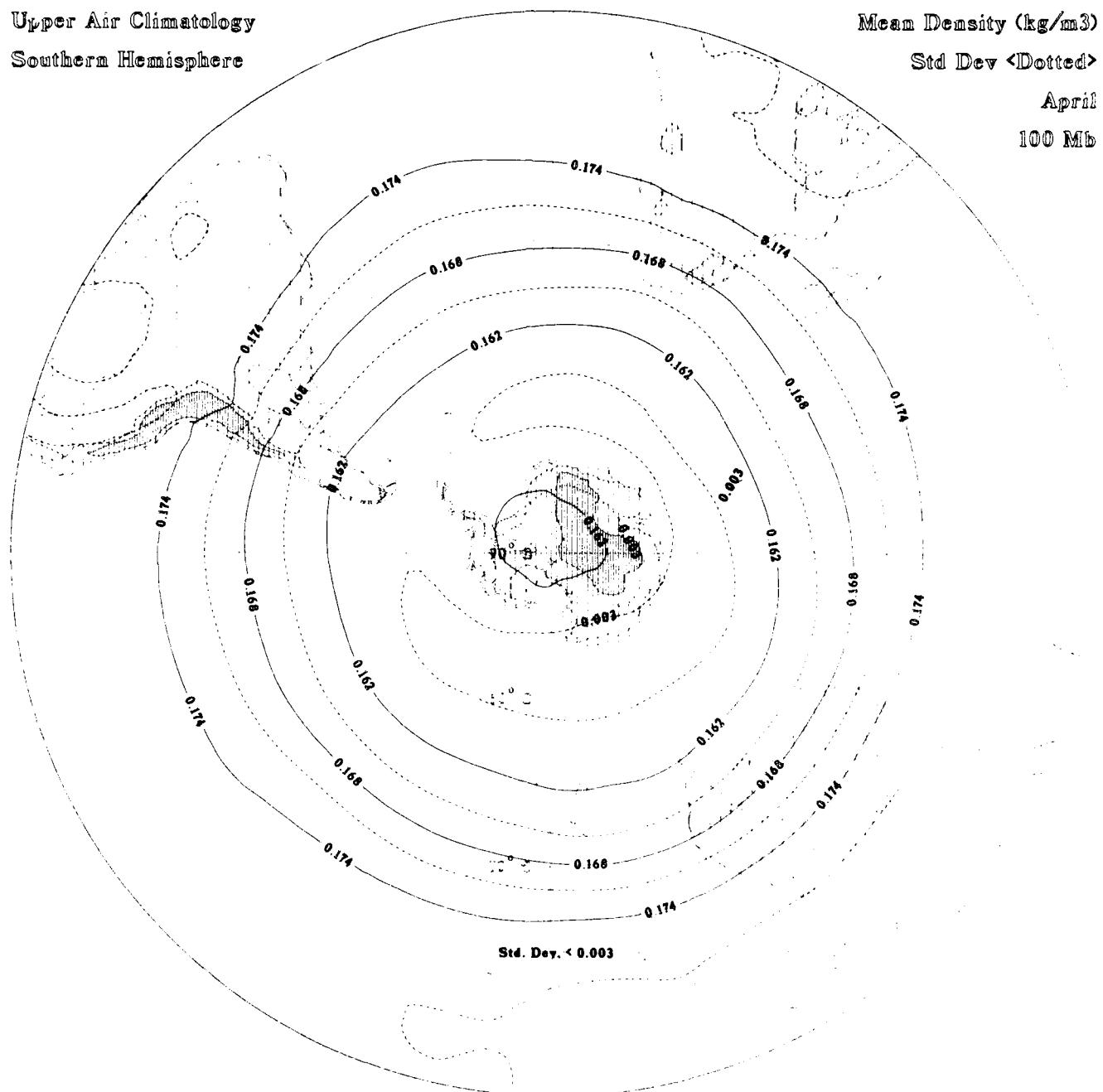
Upper Air Climatology
Southern Hemisphere

Mean Density (kg/m^3)

Std Dev < Dotted >

April

100 Mb



Mean Density (kg/m³)

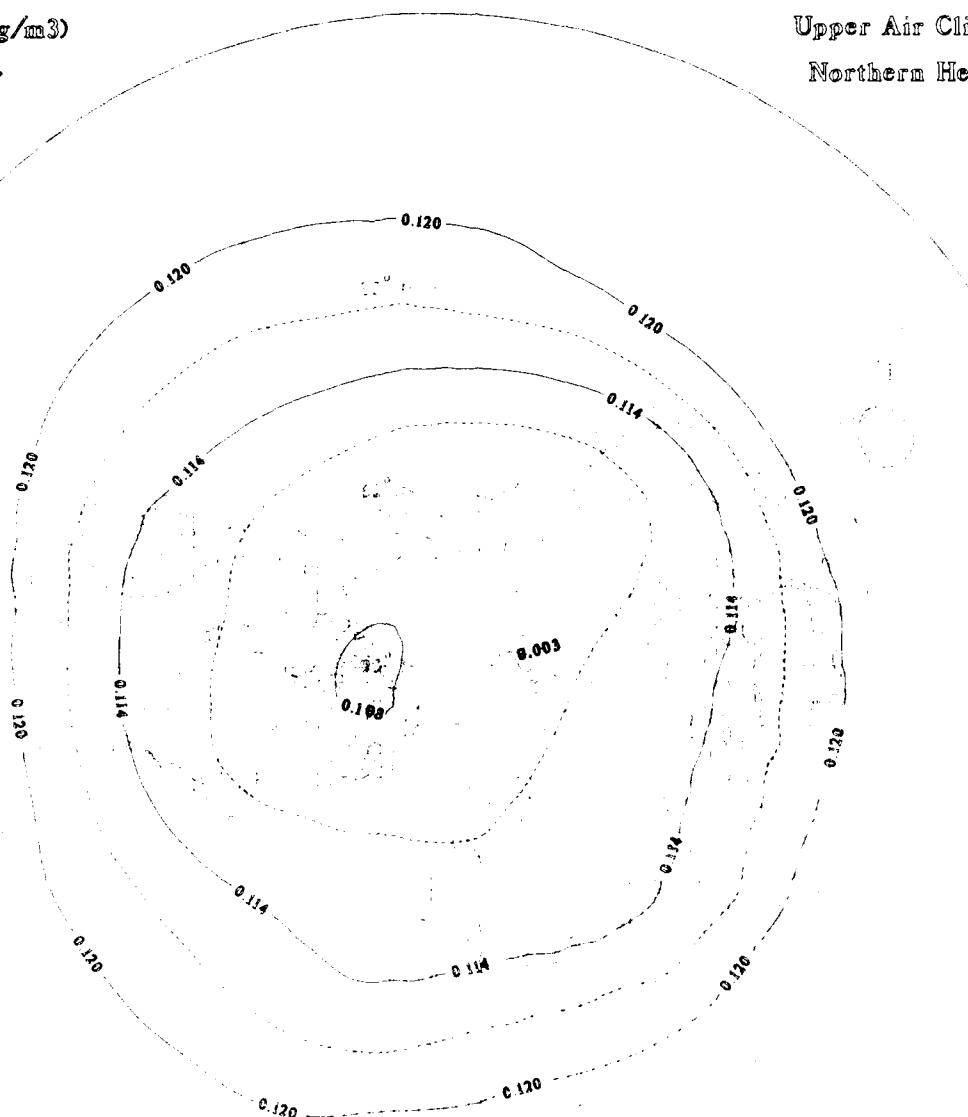
Std Dev < Dotted >

April

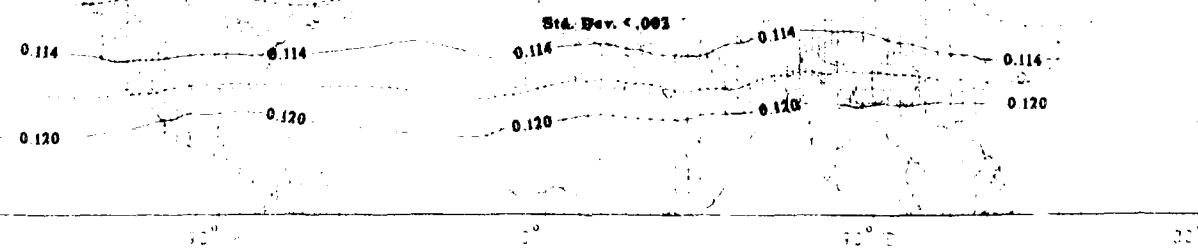
70 Mb

Upper Air Climatology

Northern Hemisphere



Std. Dev. < 0.003



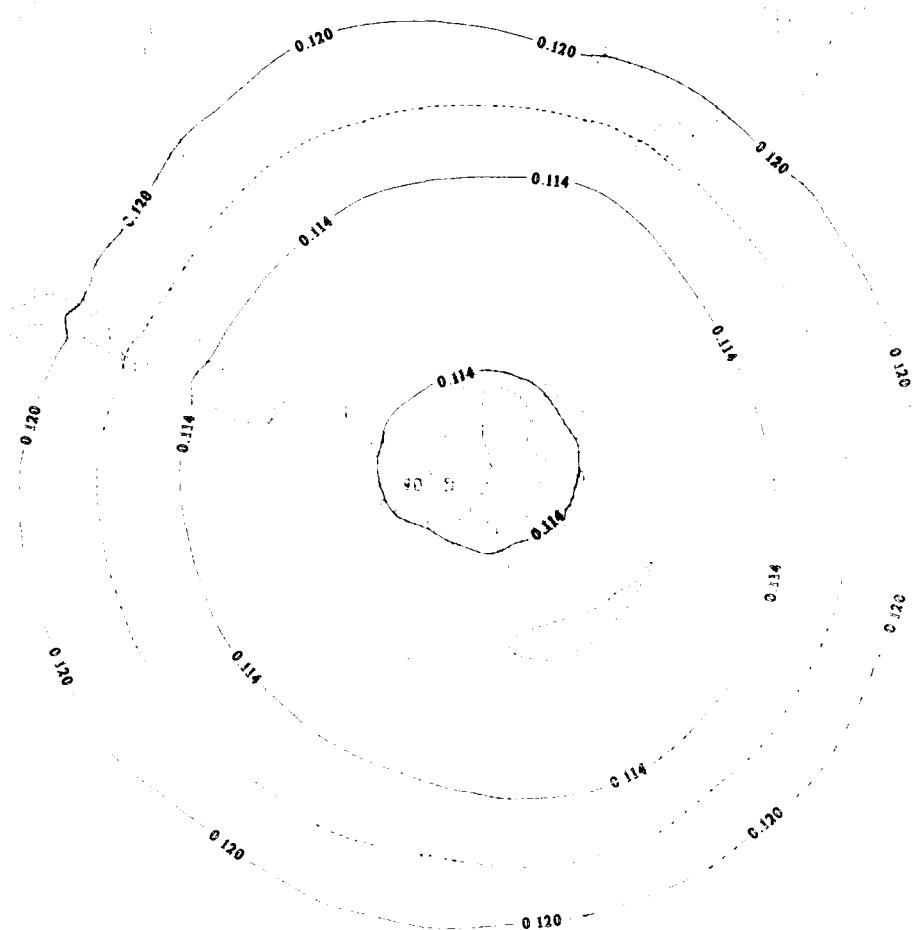
Upper Air Climatology Southern Hemisphere

Mean Density (kg/m³)

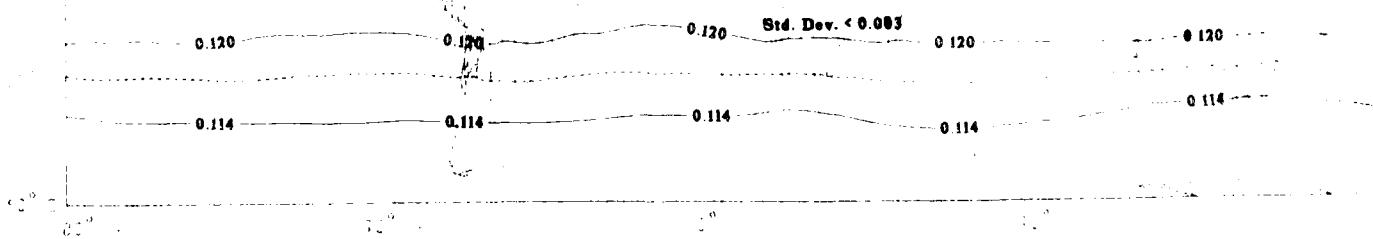
Std Dev <Dotted>

April

70 Mb



Std. Dev. < 0.003



Mean Density (kg/m^3)

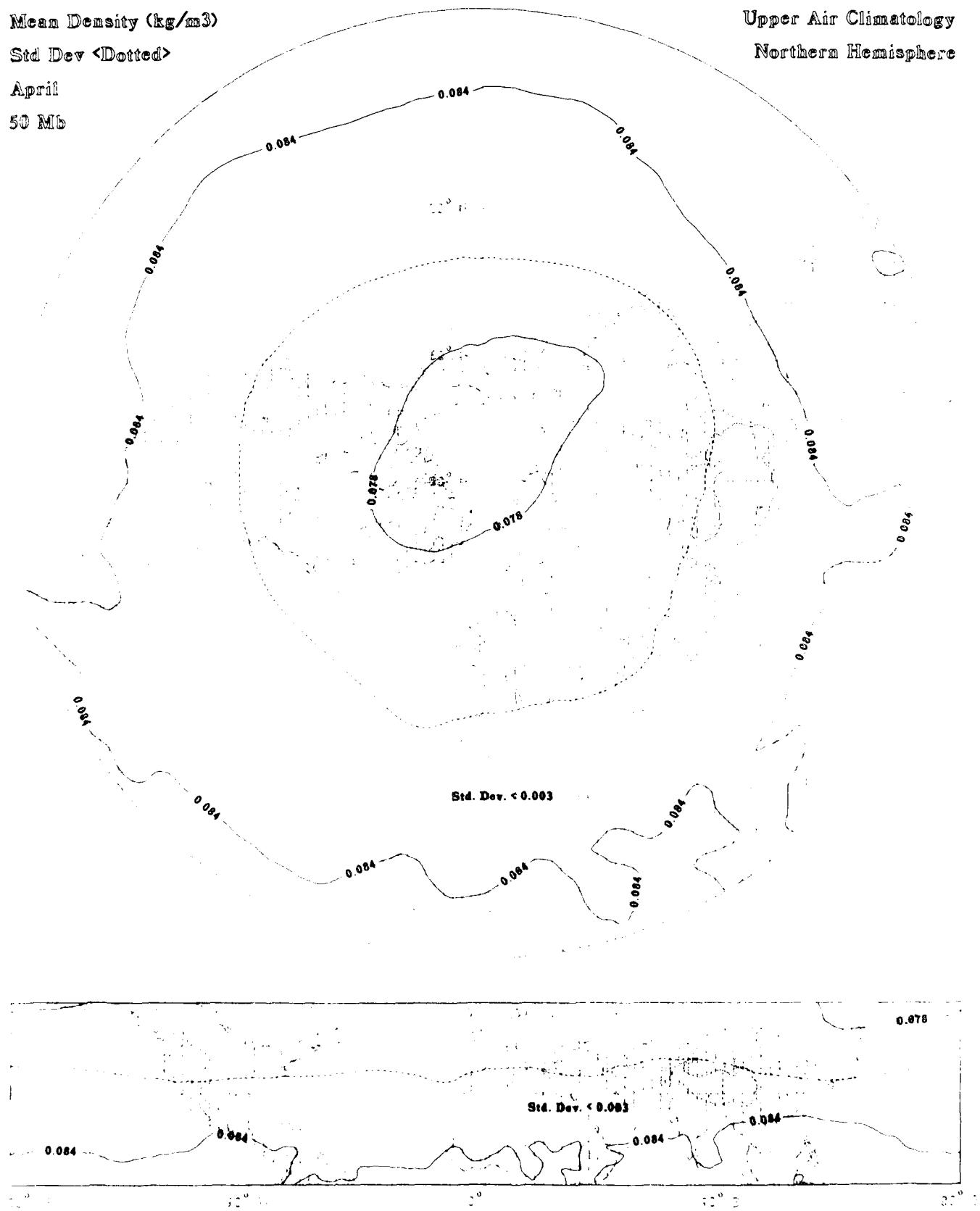
Std Dev < Dotted >

April

50 Mb

Upper Air Climatology

Northern Hemisphere



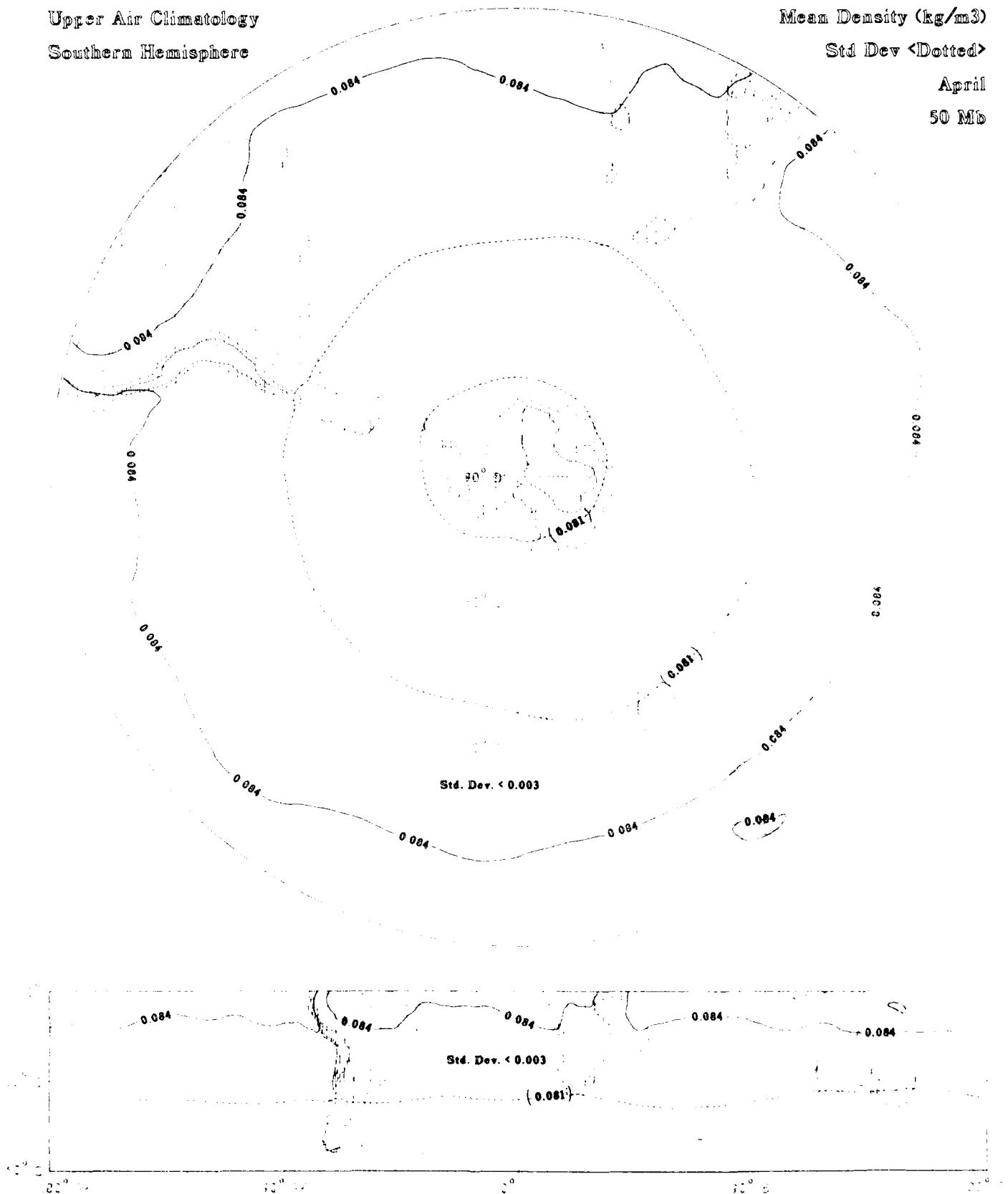
Upper Air Climatology
Southern Hemisphere

Mean Density (kg/m^3)

Std Dev < Dotted >

April

50 Mb



Mean Density (kg/m³)

Std Dev < Dotted >

April

10 Mb

Upper Air Climatology
Northern Hemisphere

0.048

0.048

0.048

0.048

0.048

0.048

0.048

0.048

Density < 0.048

Std. Dev. < 0.003

0.048

0.048

0.048

0.048

Density < 0.048

Std. Dev. < 0.003

0.048

0.048

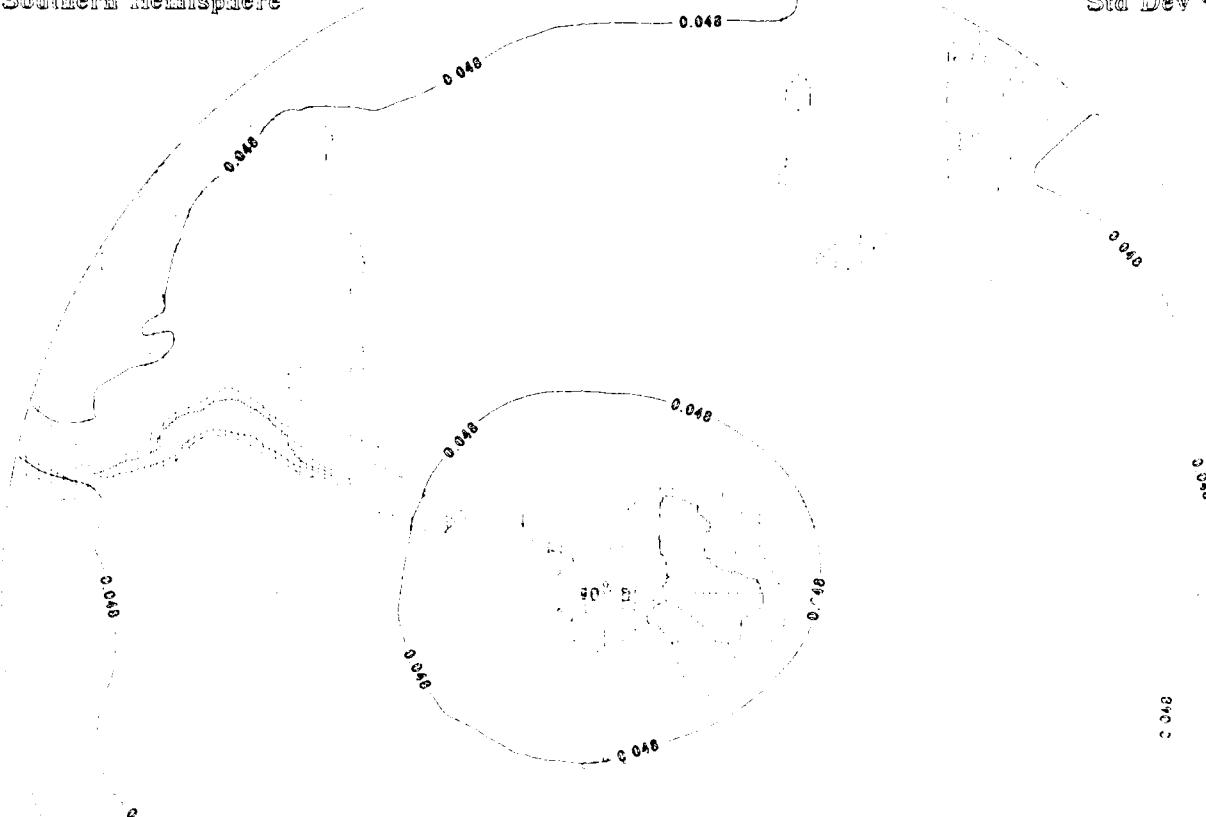
Upper Air Climatology Southern Hemisphere

Mean Density (kg/m³)

Std Dev <Dotted>

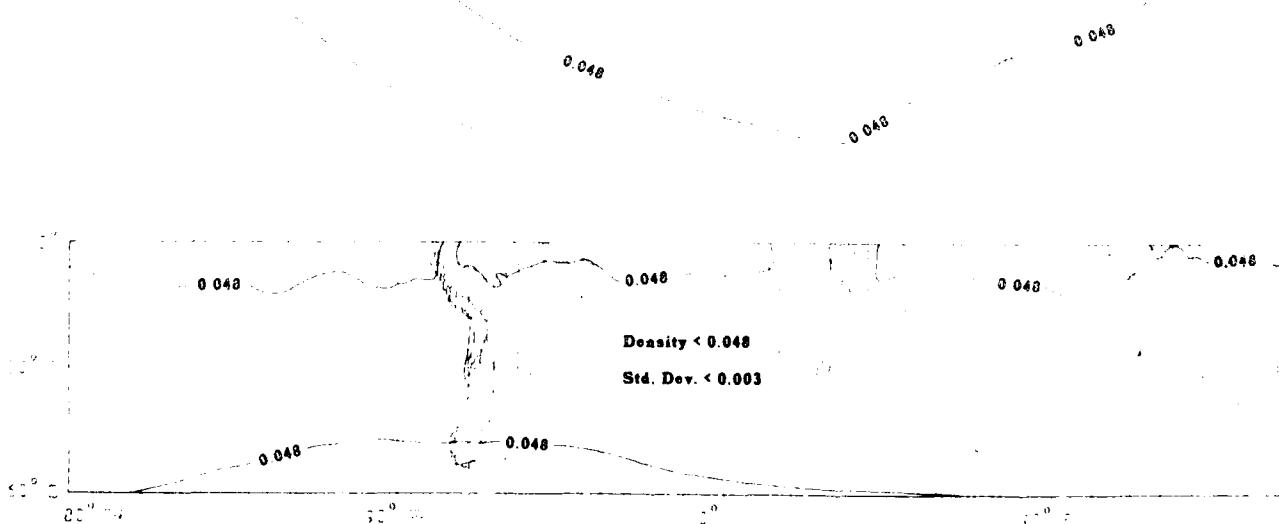
六

20 M



Density < 0.048

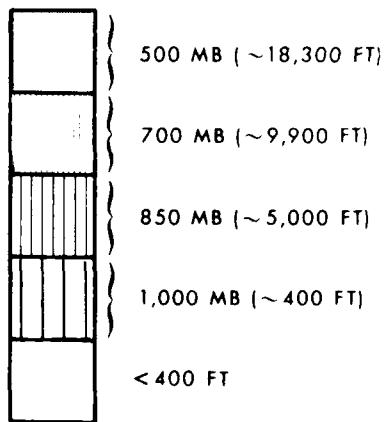
Std. Dev. < 0.003



**STANDARD DEVIATION OF HEIGHT
STANDARD DEVIATION OF VECTOR MEAN WIND
(13 LEVELS, 1000 TO 30 MB)**

- Contours of standard deviation of height (solid lines) in geopotential dekameters
- Standard deviation of height labeled interval:
 - 3 dekameters (30 meters) - 1000 MB to 400 MB
 - 6 dekameters (60 meters) - 300 MB to 200 MB
 - 4 dekameters (40 meters) - 150 MB to 30 MB
- Contours of standard deviation of vector mean wind (dashed lines) in knots
- Standard deviation of vector mean wind labeled interval: 5 knots
- Contours blanked for geographic areas with elevations exceeding specified geopotential heights

ELEVATION SCALE



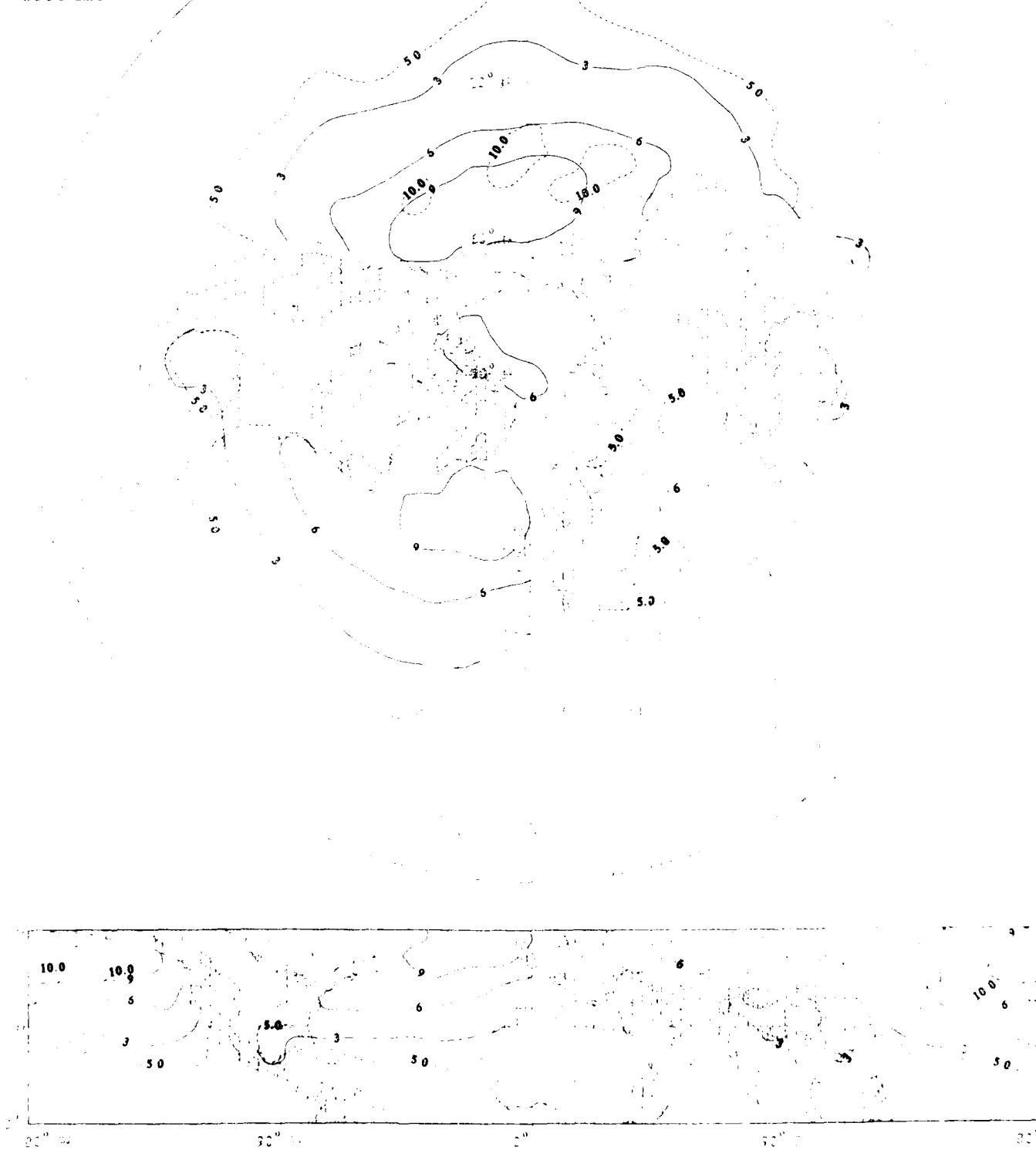
Height (dkm) Std Dev <Solid>

Vector Std Dev (kt)

April

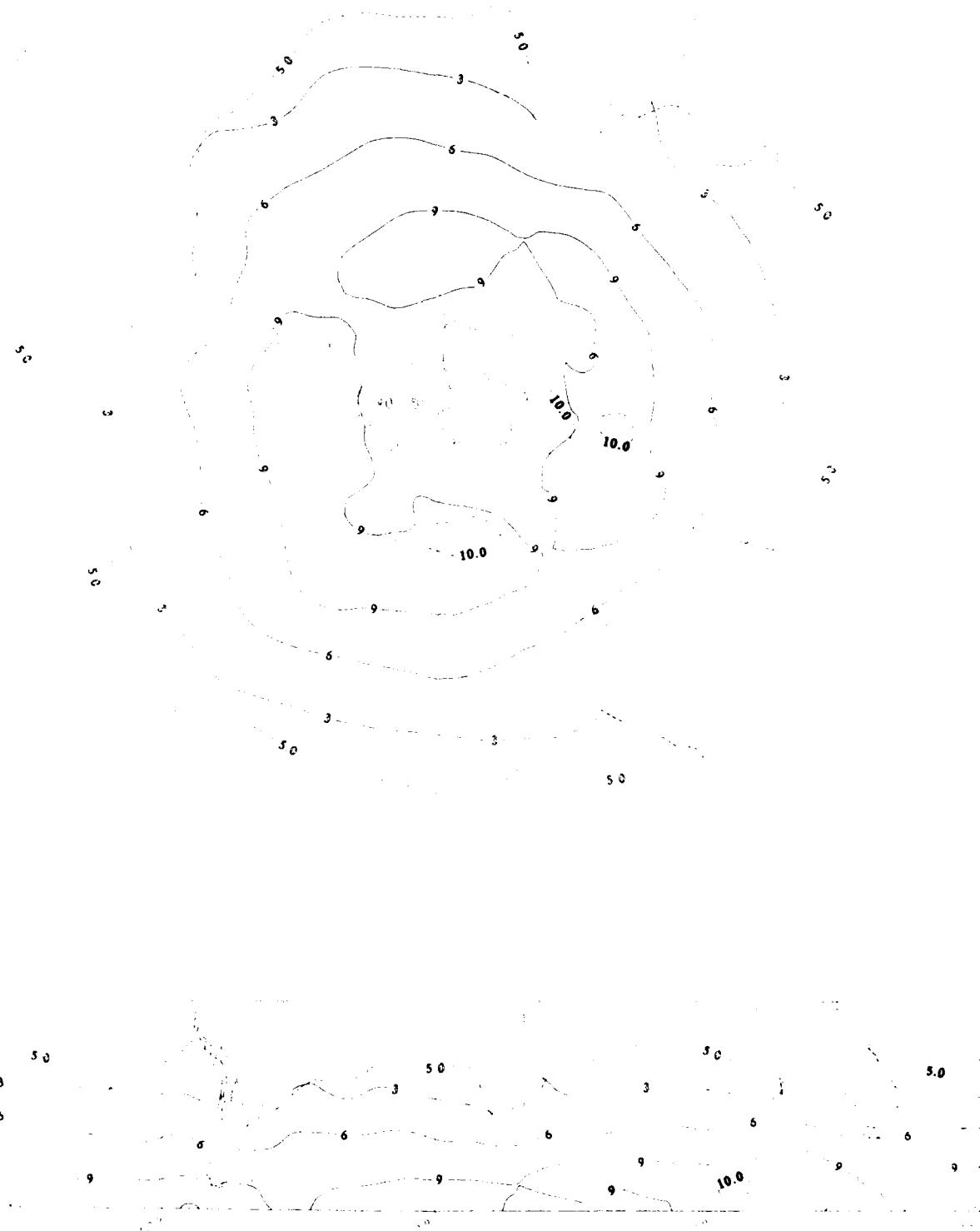
1000 Mb

Upper Air Climatology
Northern Hemisphere



Upper Air Climatology
Northern Hemisphere

Height (dkm) Std Dev <Scale>
Vector Std Dev (ft)
April
1000 MB



Height (diam) Std Dev <Solid>

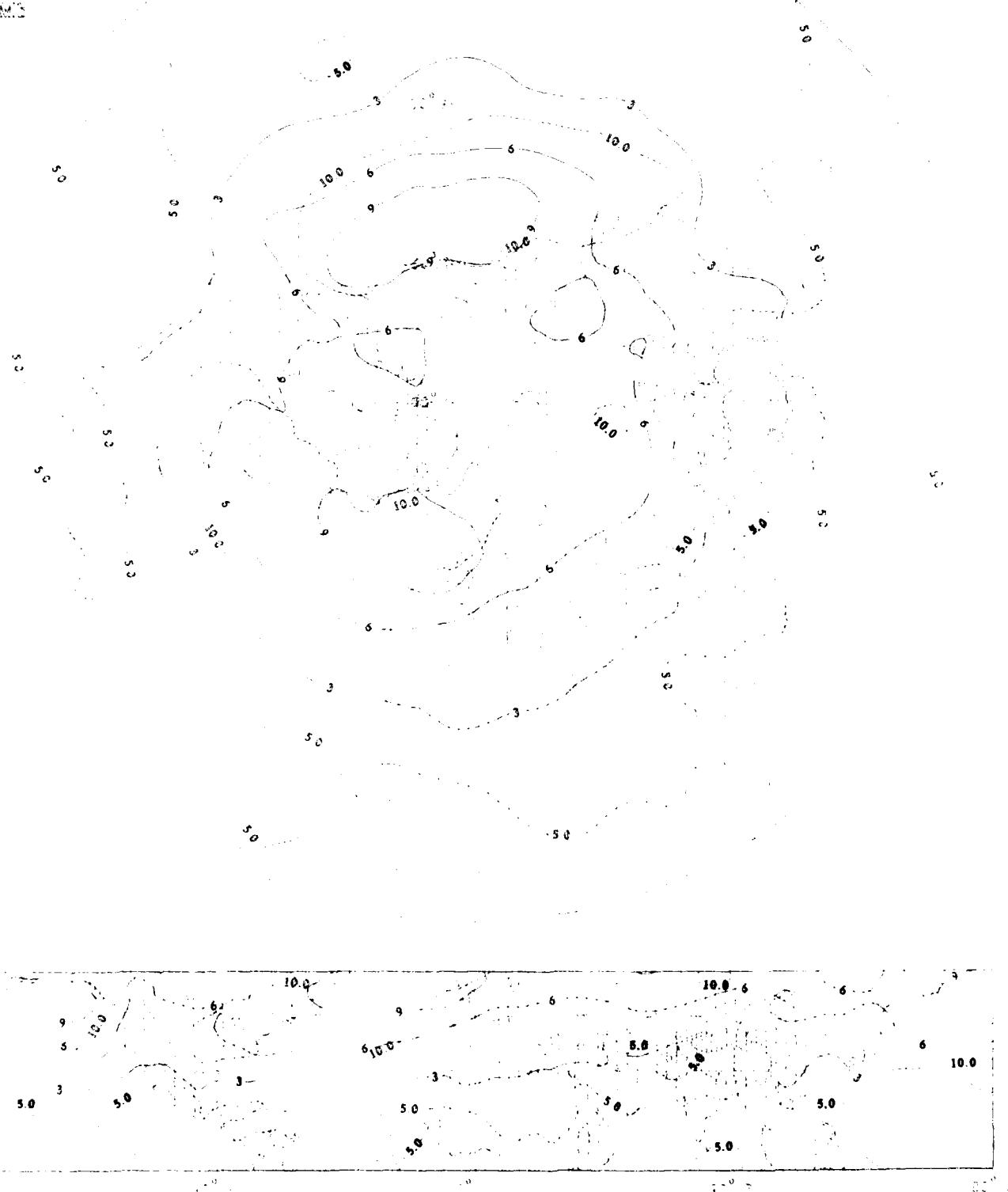
Vector Std Dev (ft)

Height

300 MB

Upper Air Climatology

Northern Hemisphere



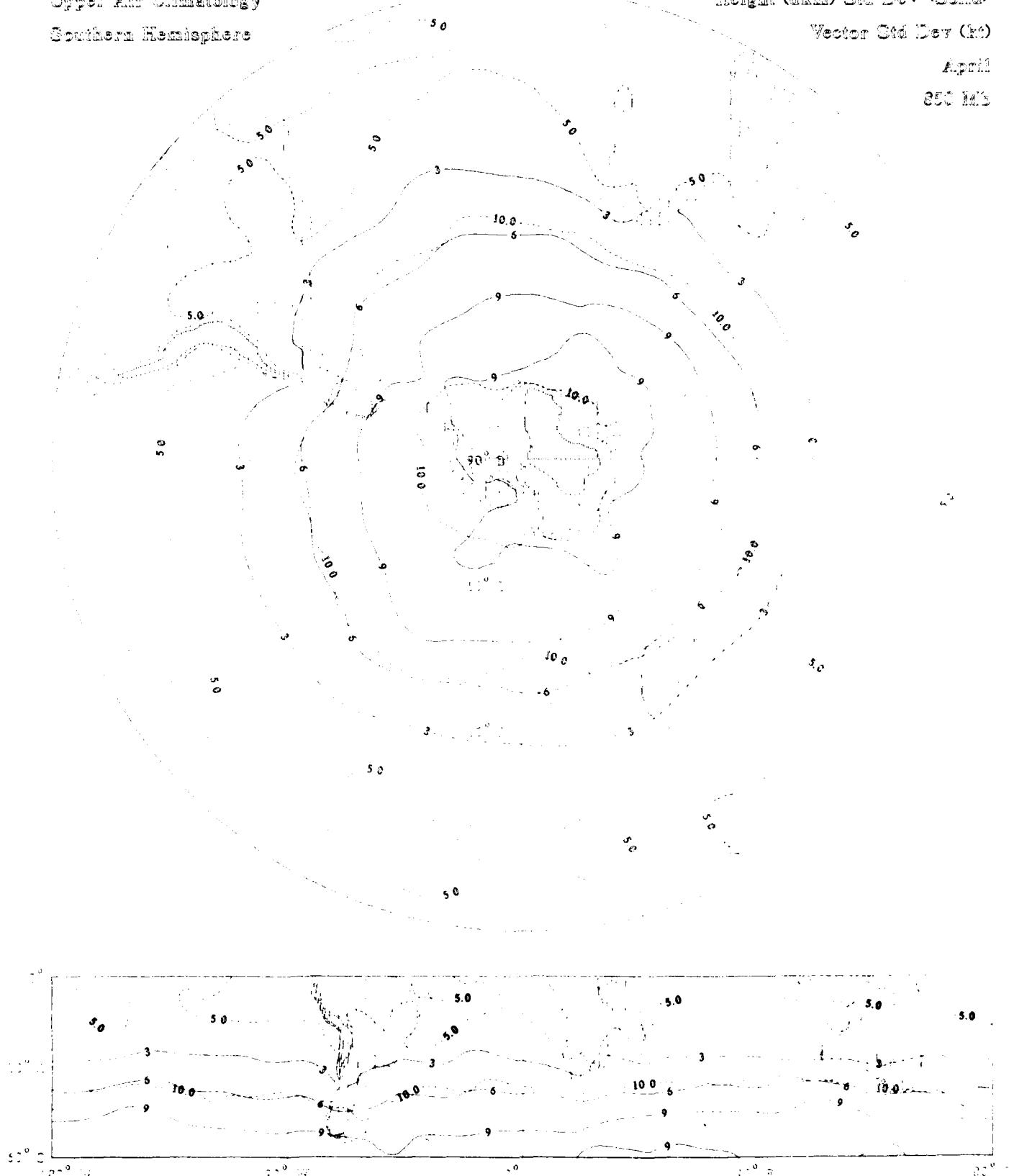
Upper Air Climatology
Southern Hemisphere

Height (dkm) Std Dev <Solid>

Vector Std Dev (K)

April

850 MS



Height (dkm) Std Dev <Solid>

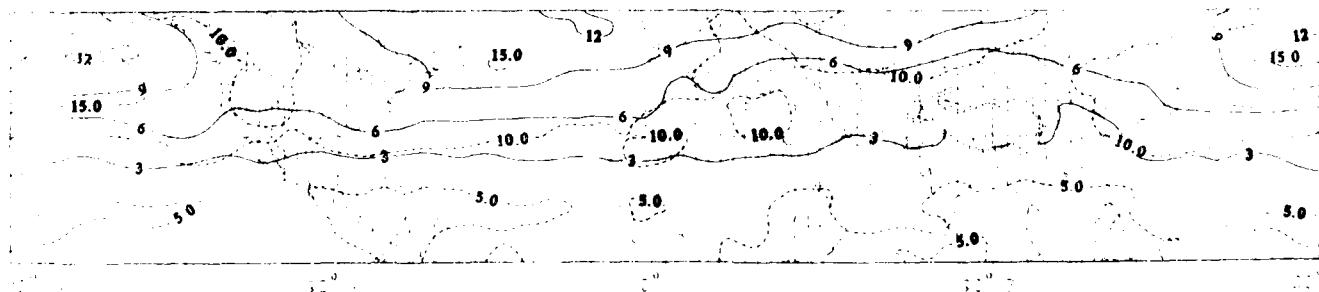
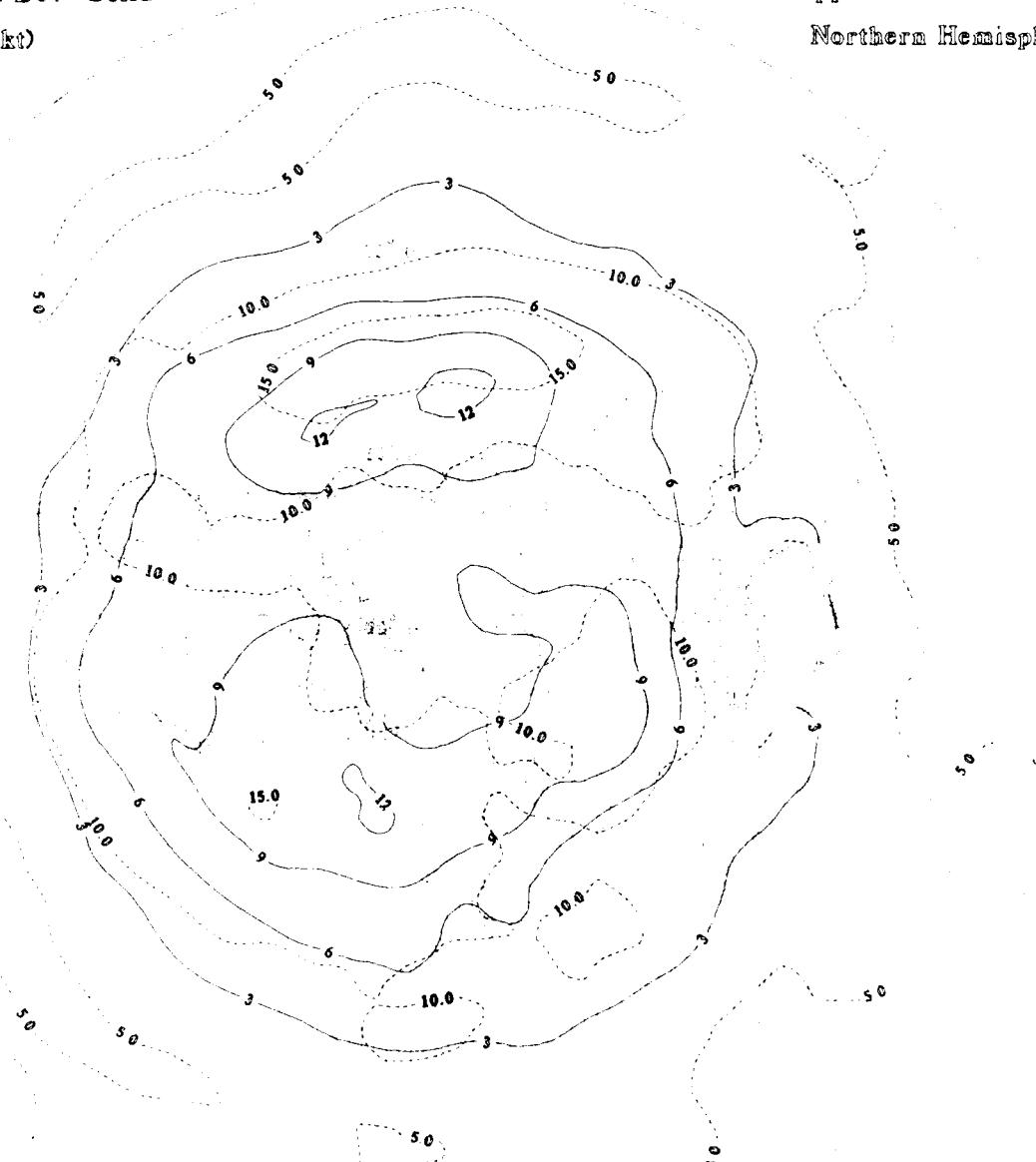
Vector Std Dev (kt)

April

700 MB

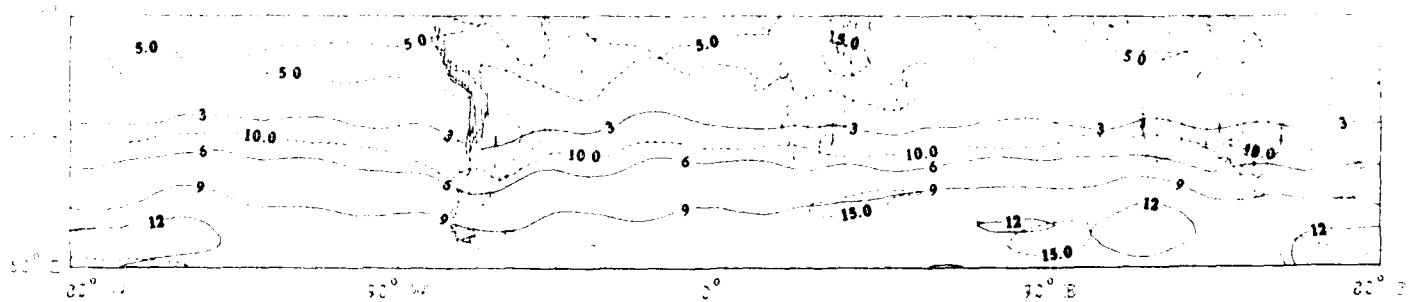
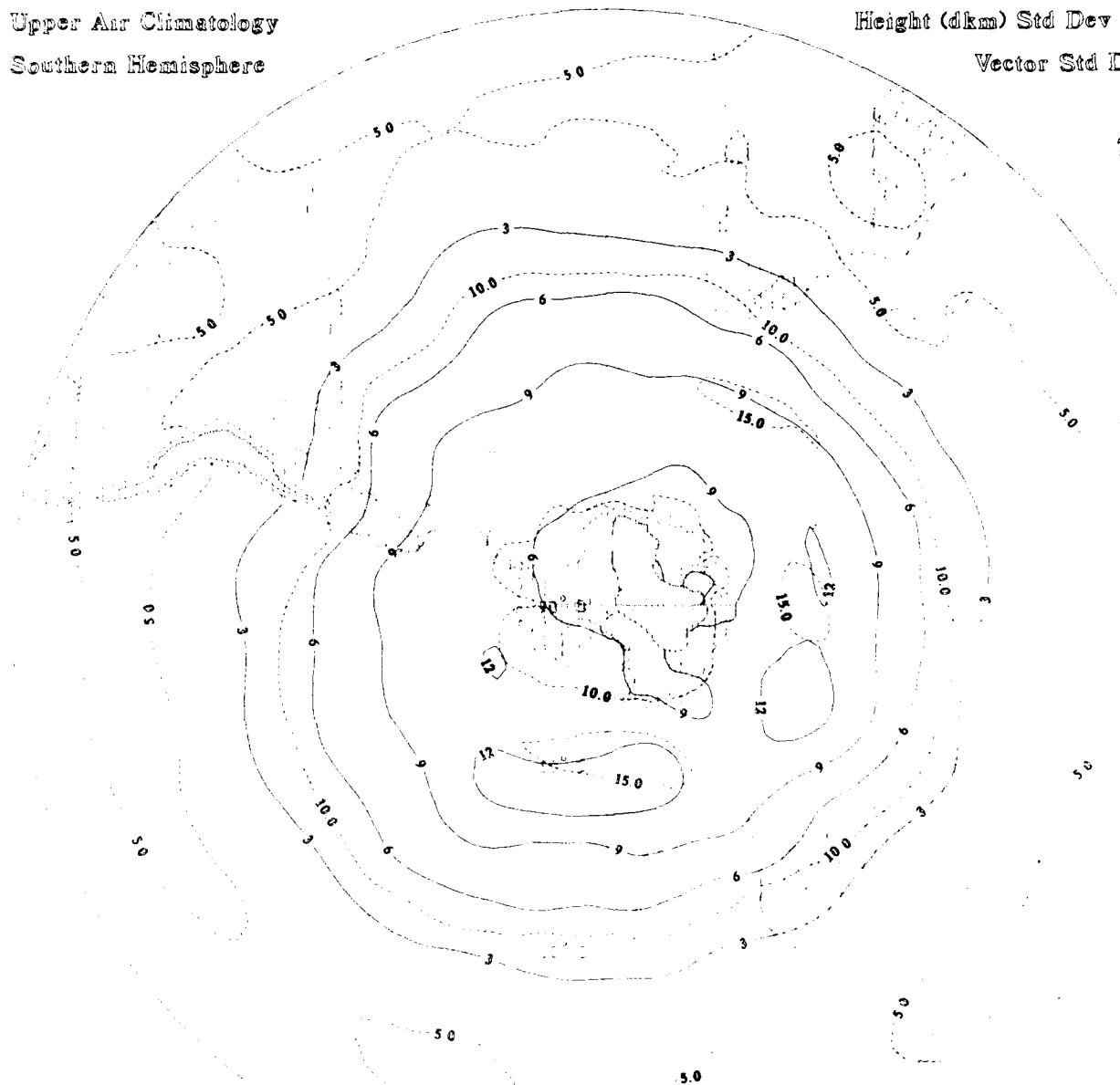
Upper Air Climatology

Northern Hemisphere



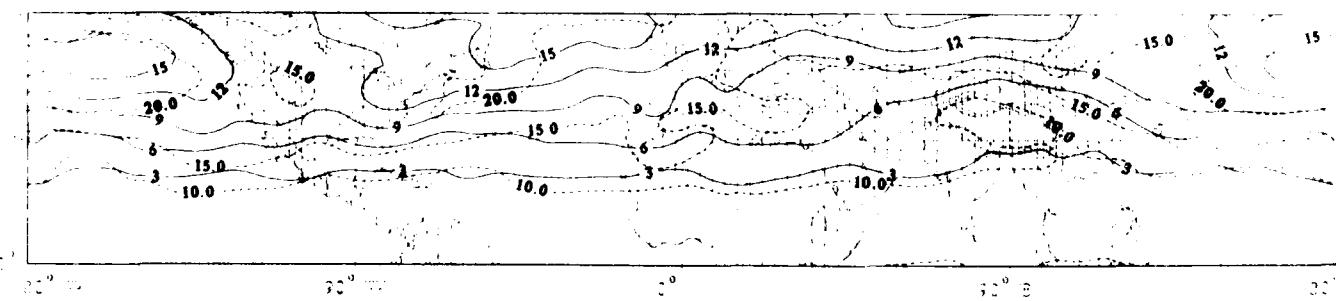
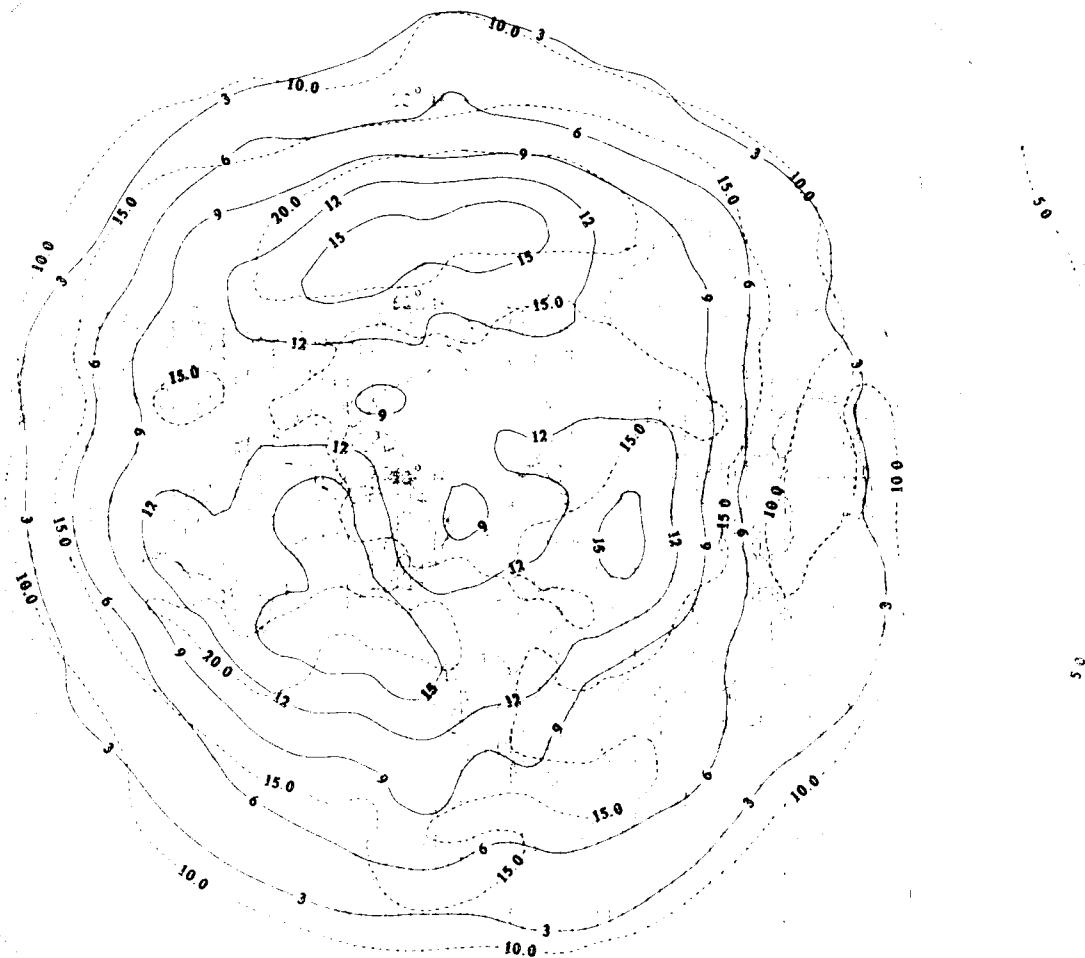
Upper Air Climatology
Southern Hemisphere

Height (dkm) Std Dev <Solid>
Vector Std Dev (kt)
April
700 Mb



Height (dkm) Std Dev <Solid>
Vector Std Dev (kt)
April
500 Mb

Upper Air Climatology
Northern Hemisphere



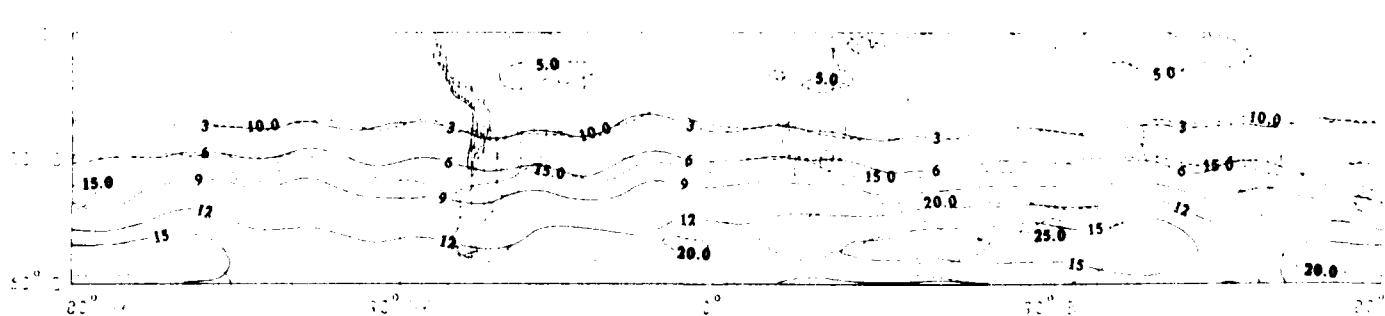
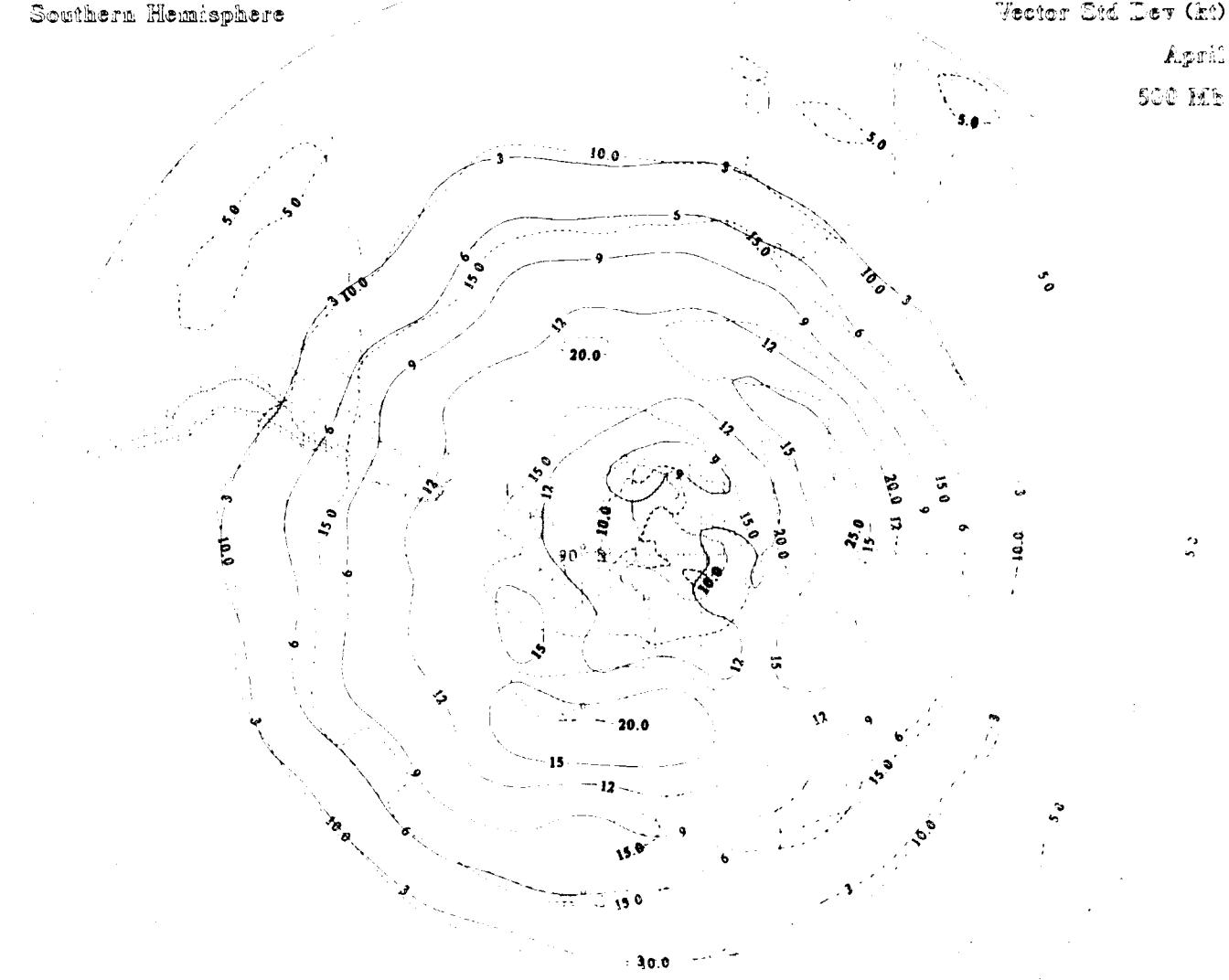
Upper Air Climatology Southern Hemisphere

Height (dkm) Std Dev <Cell>

Vector Svd Zey (k)

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500 MB



Height (dkm) Std Dev <Solid>

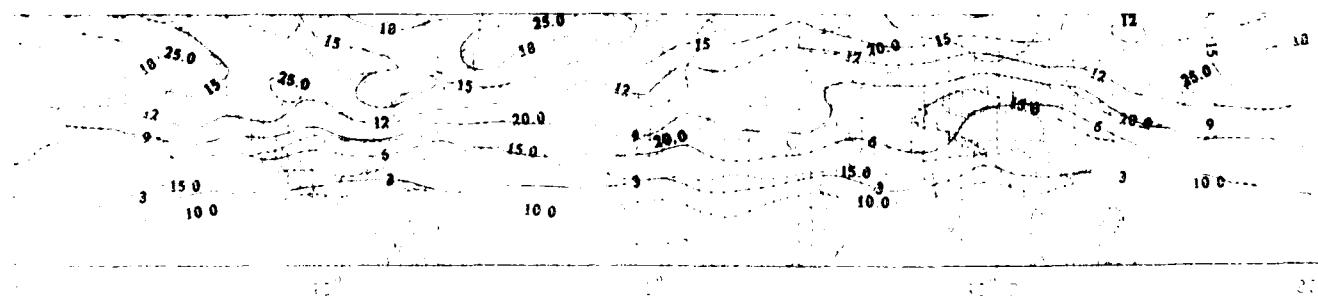
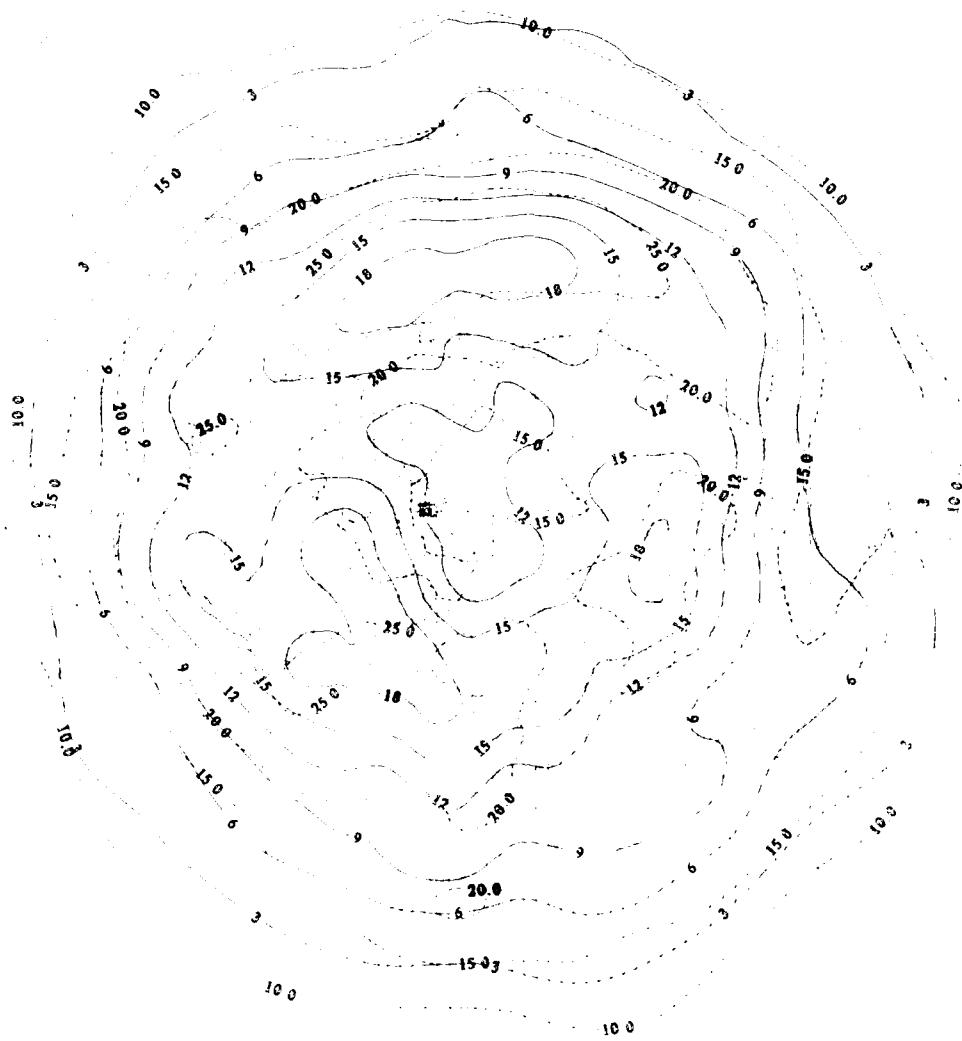
Vector Std Dev (kt)

A.J. Trenberth

400 MB

Upper Air Climatology

Northern Hemisphere



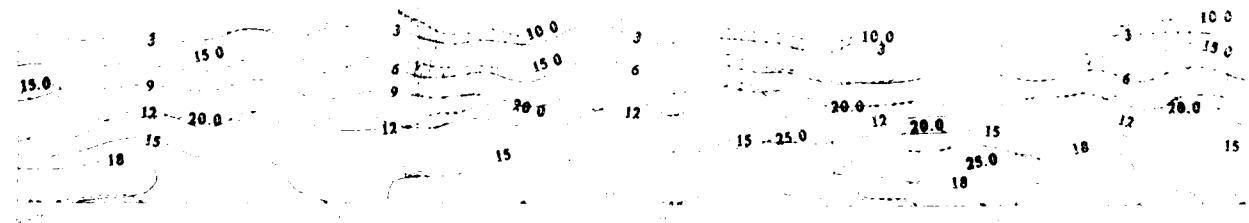
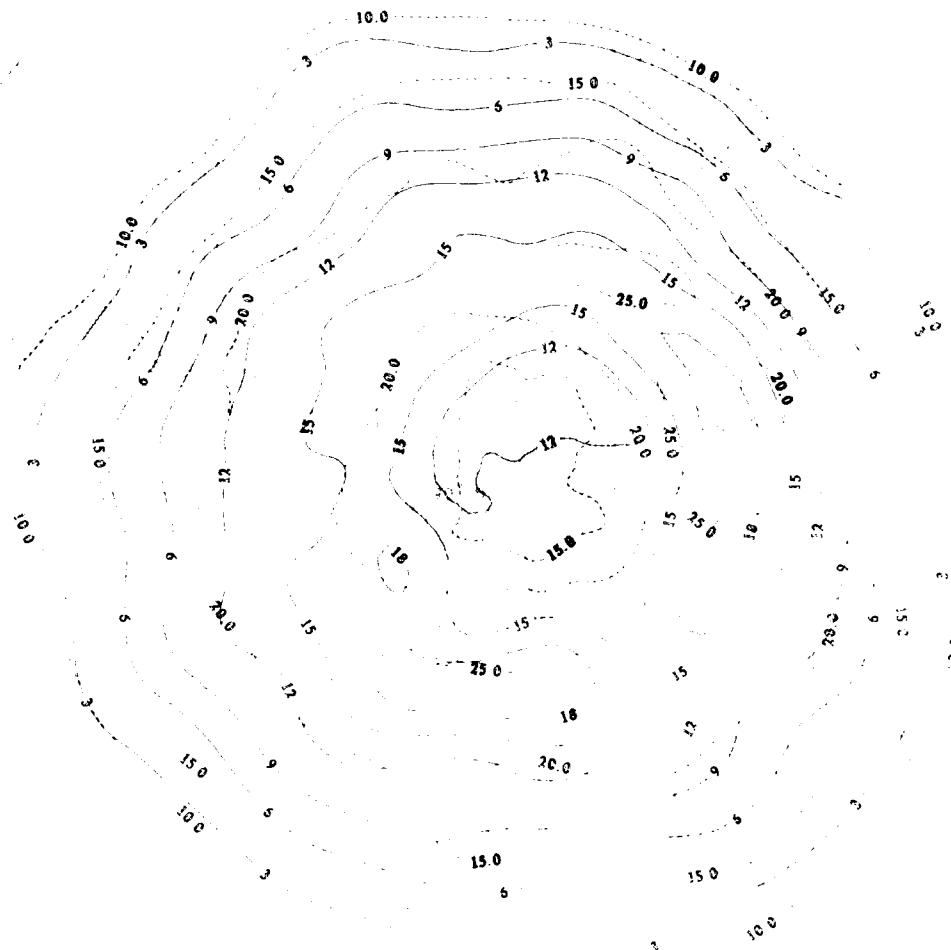
Upper Air Climatology
Southern Hemisphere

Height (d.km) Std Dev <Solid>

Vector Std Dev (ft)

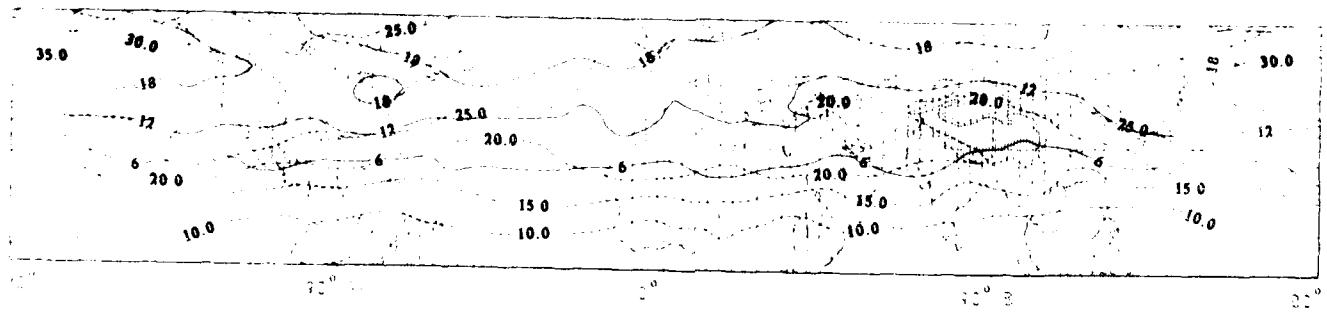
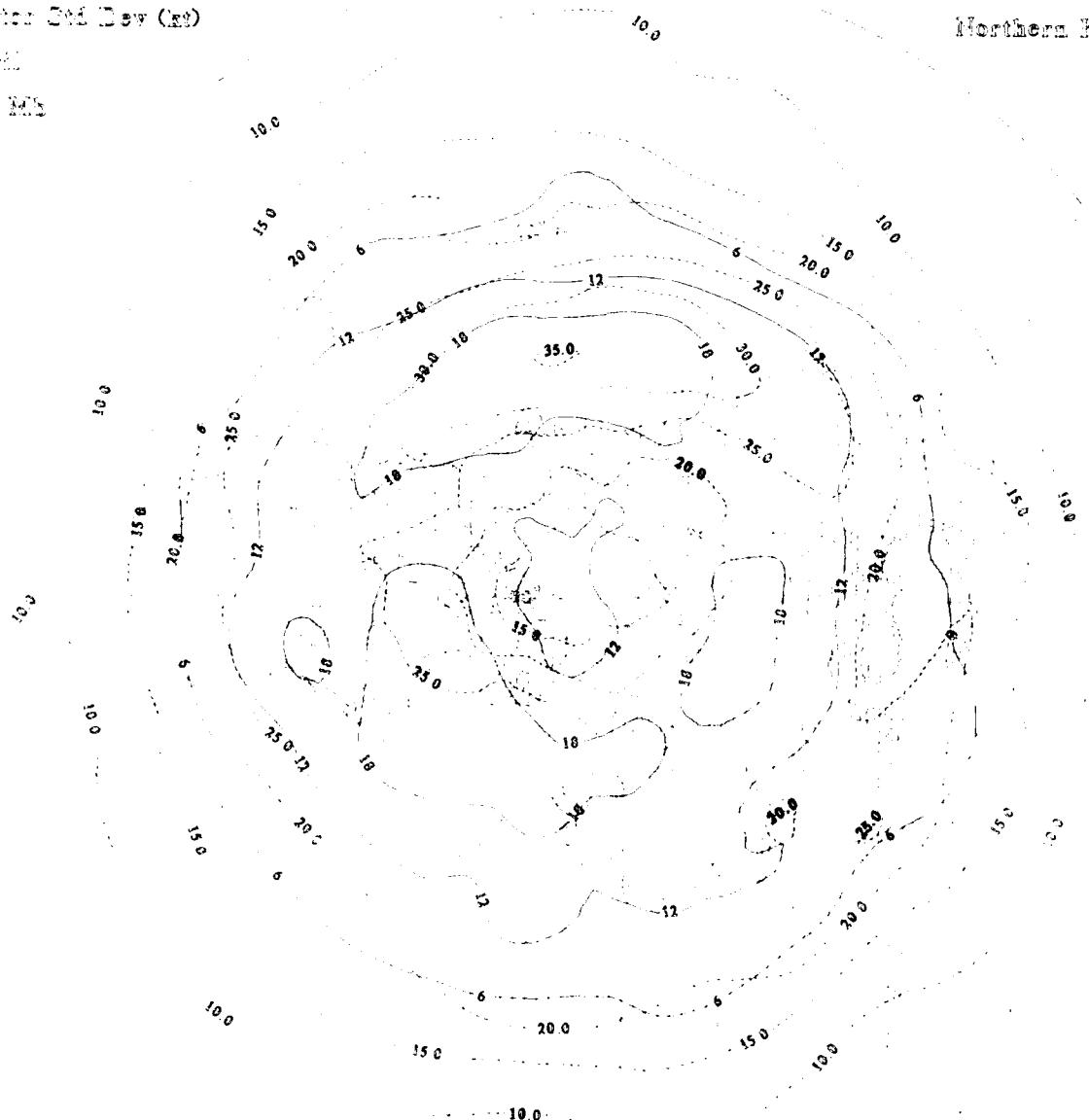
April

600 MB



Height (km) Std Dev <Solid>
Vector Std Dev (kt)
Elevation
1000 mb

Upper Air Climatology
Northern Hemisphere



Upper Air Climatology

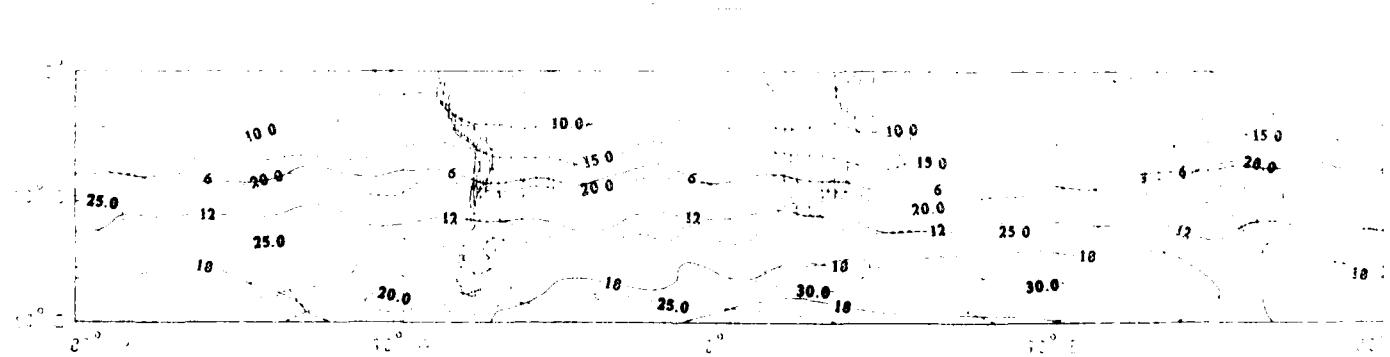
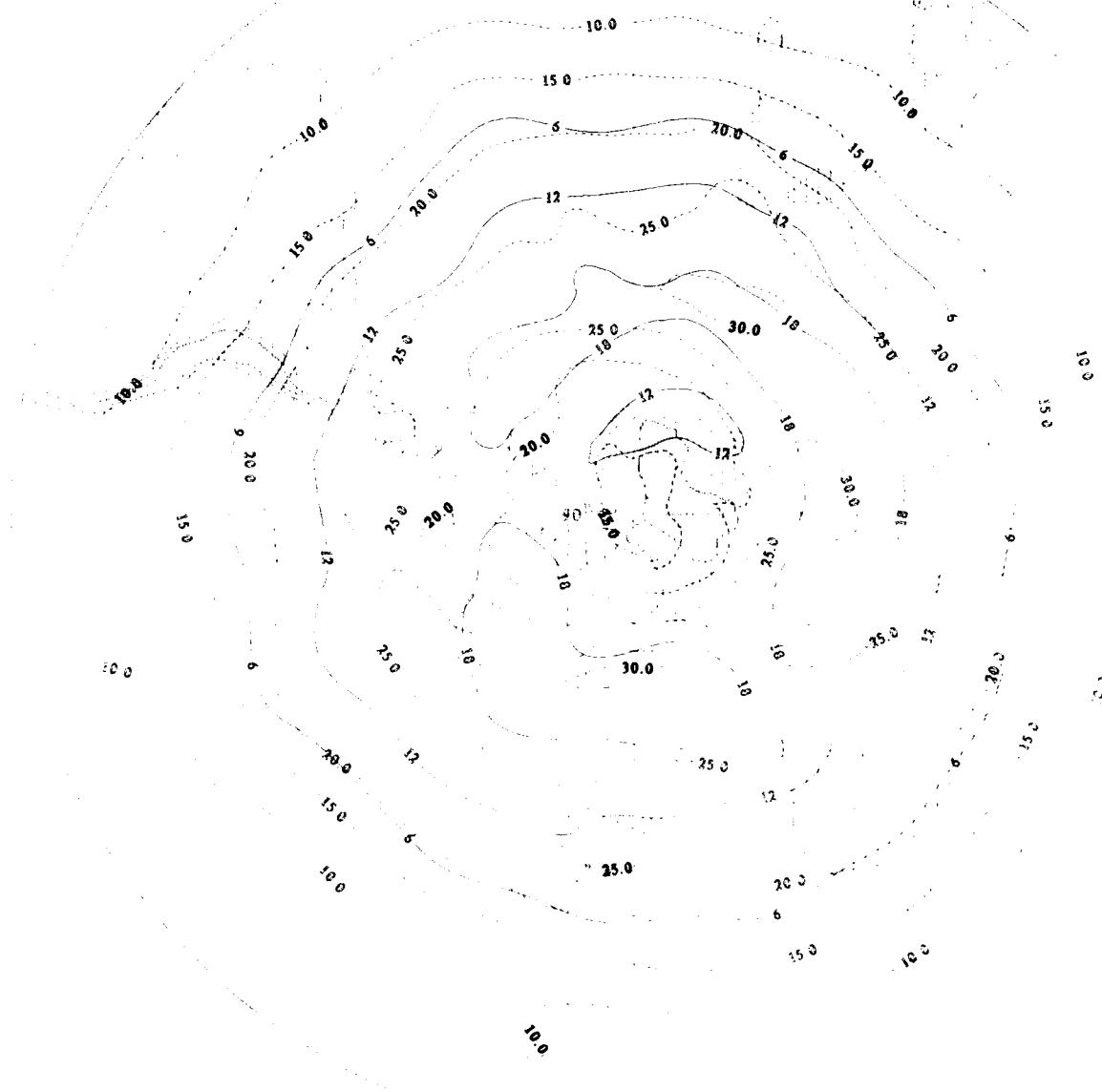
Southern Hemisphere

Height (dkm) Std Dev <Solid>

Vector Std Dev (kt)

April

200 MB



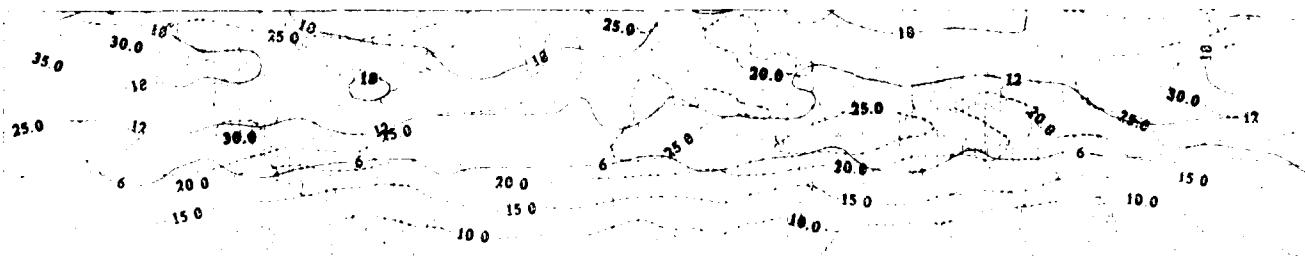
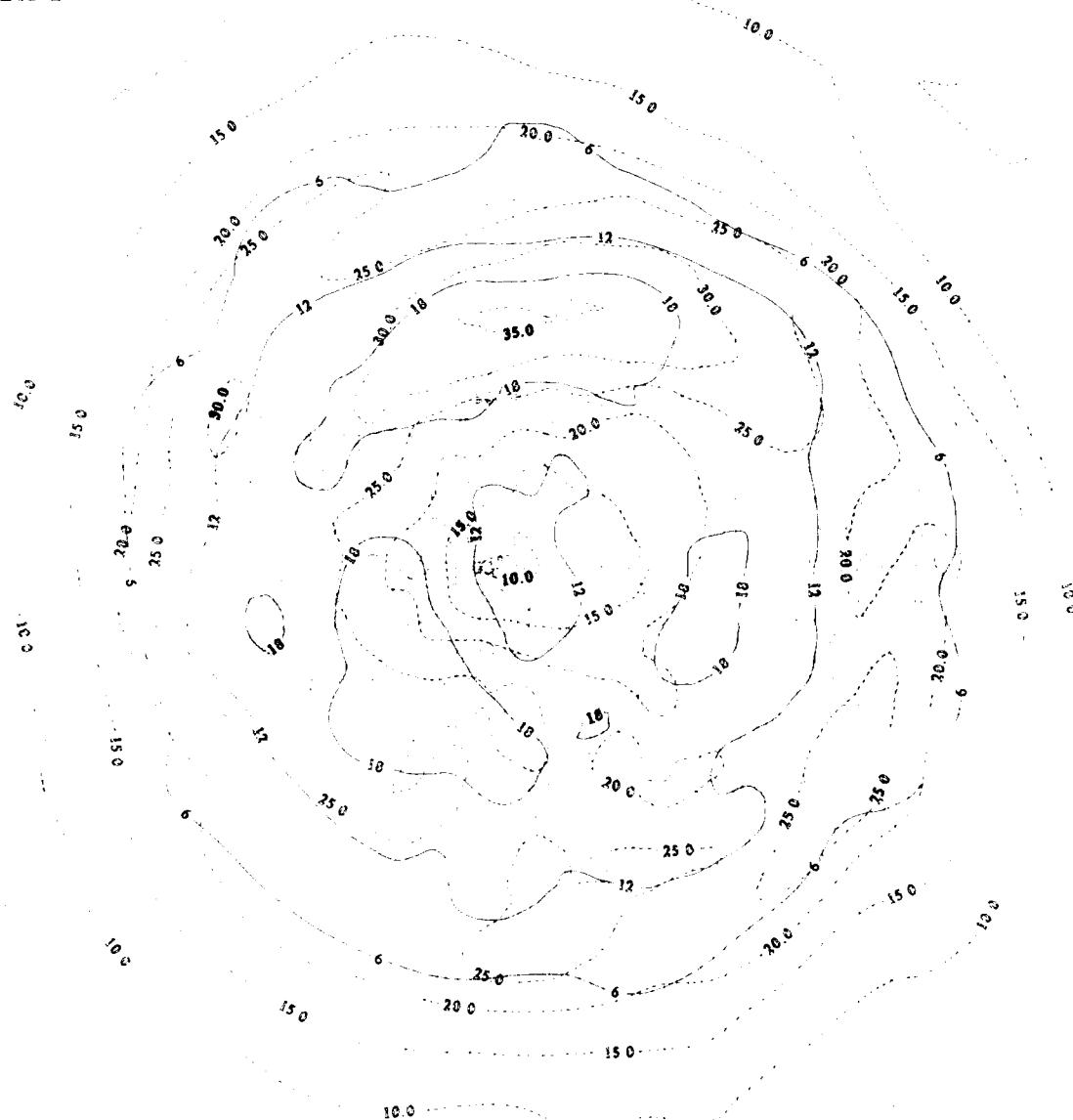
Height (dkm) Std Dev <Solid>

Vector Std Dev (kt)

April

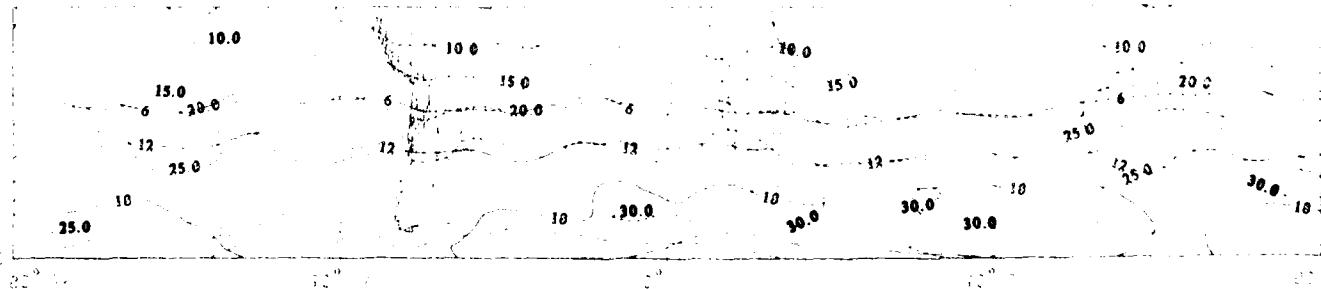
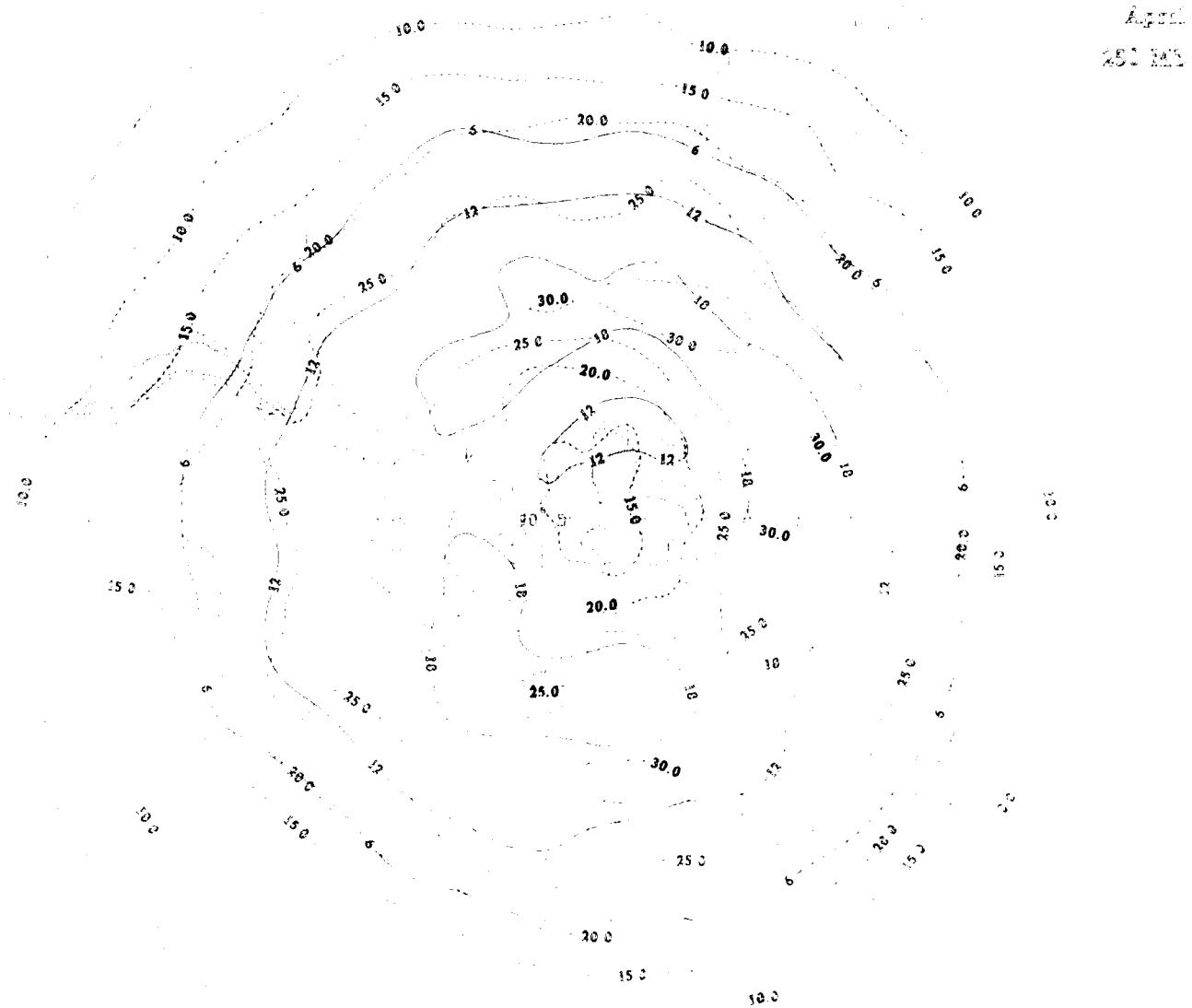
250 MB

Upper Air Climatology
Northern Hemisphere



Upper Air Climatology
Southern Hemisphere

Height (dkm) Std Dev <Solid>
Vector Std Dev (ft)

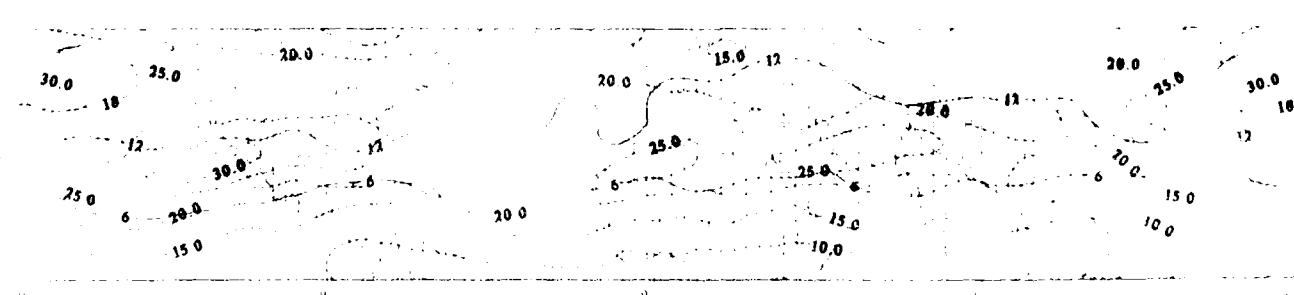
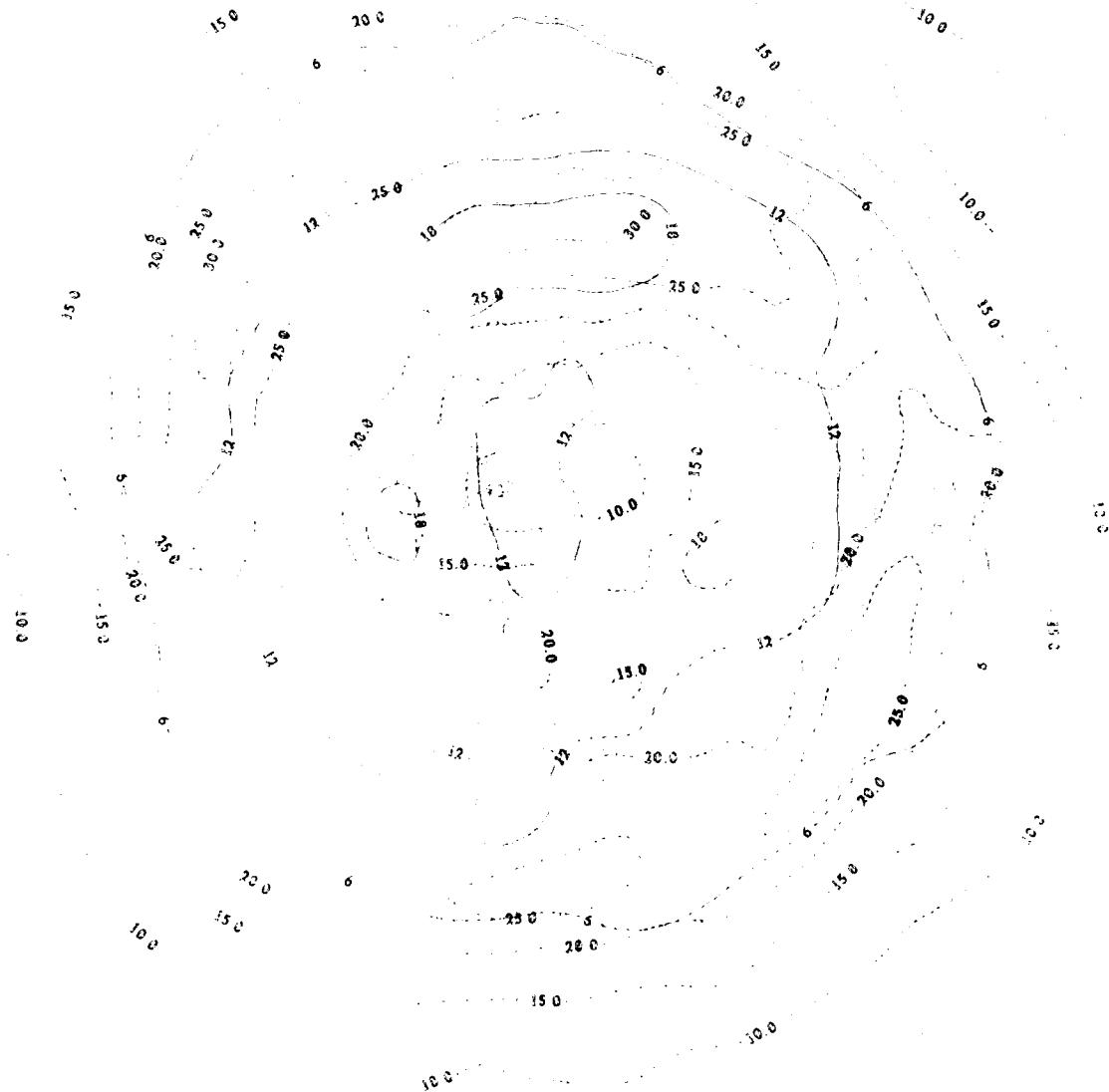


Height (dkm) Std Dev <Solid>

Vector Std Dev (m)

Angle

1000 mb



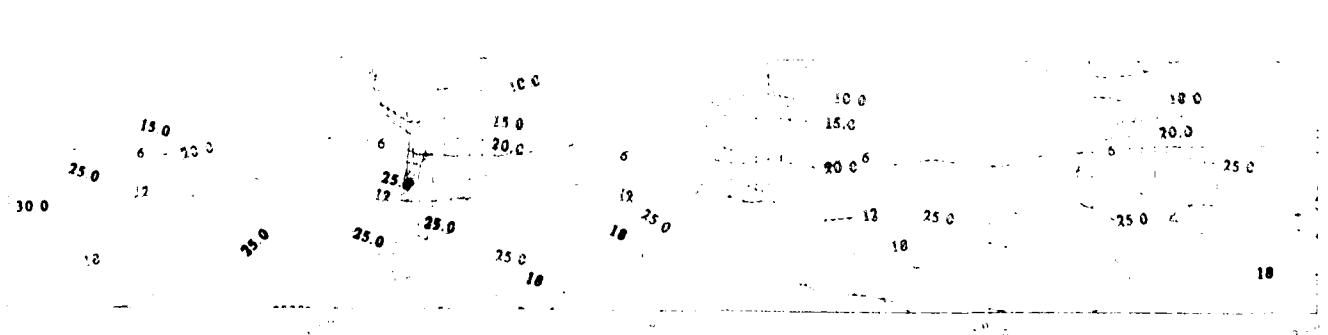
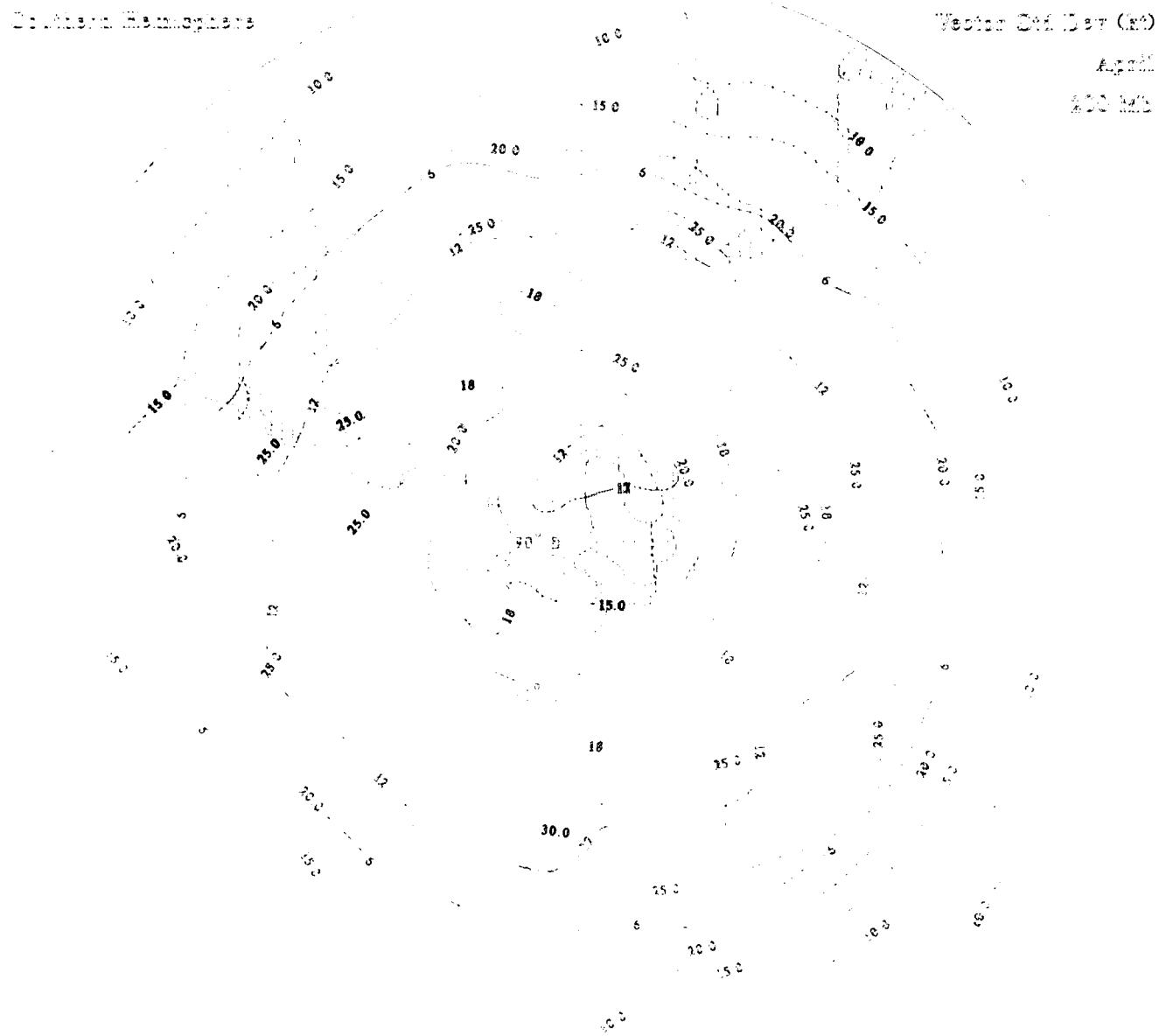
Upper and Lower Extremities
Trunk and Head

Height (cm) and Dist. (cm)

Vector Dist. (cm)

Angle

Angle



Height (ftm) Std Dev <Solid>

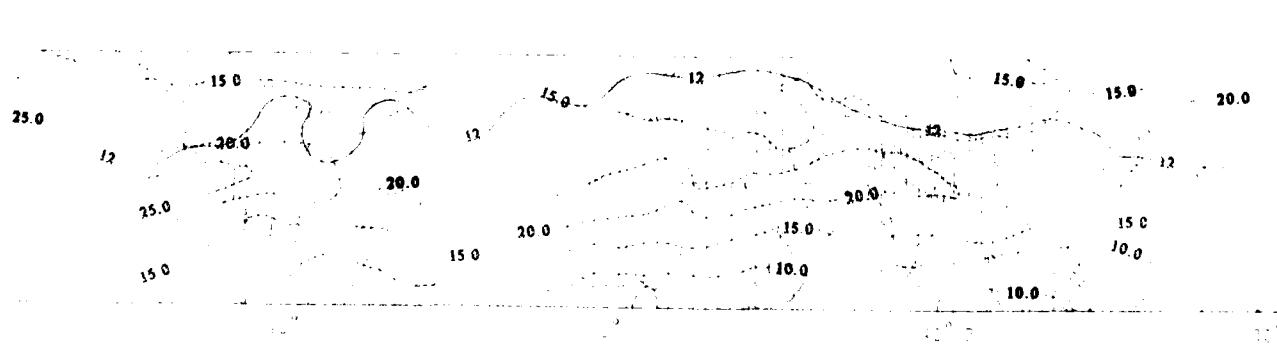
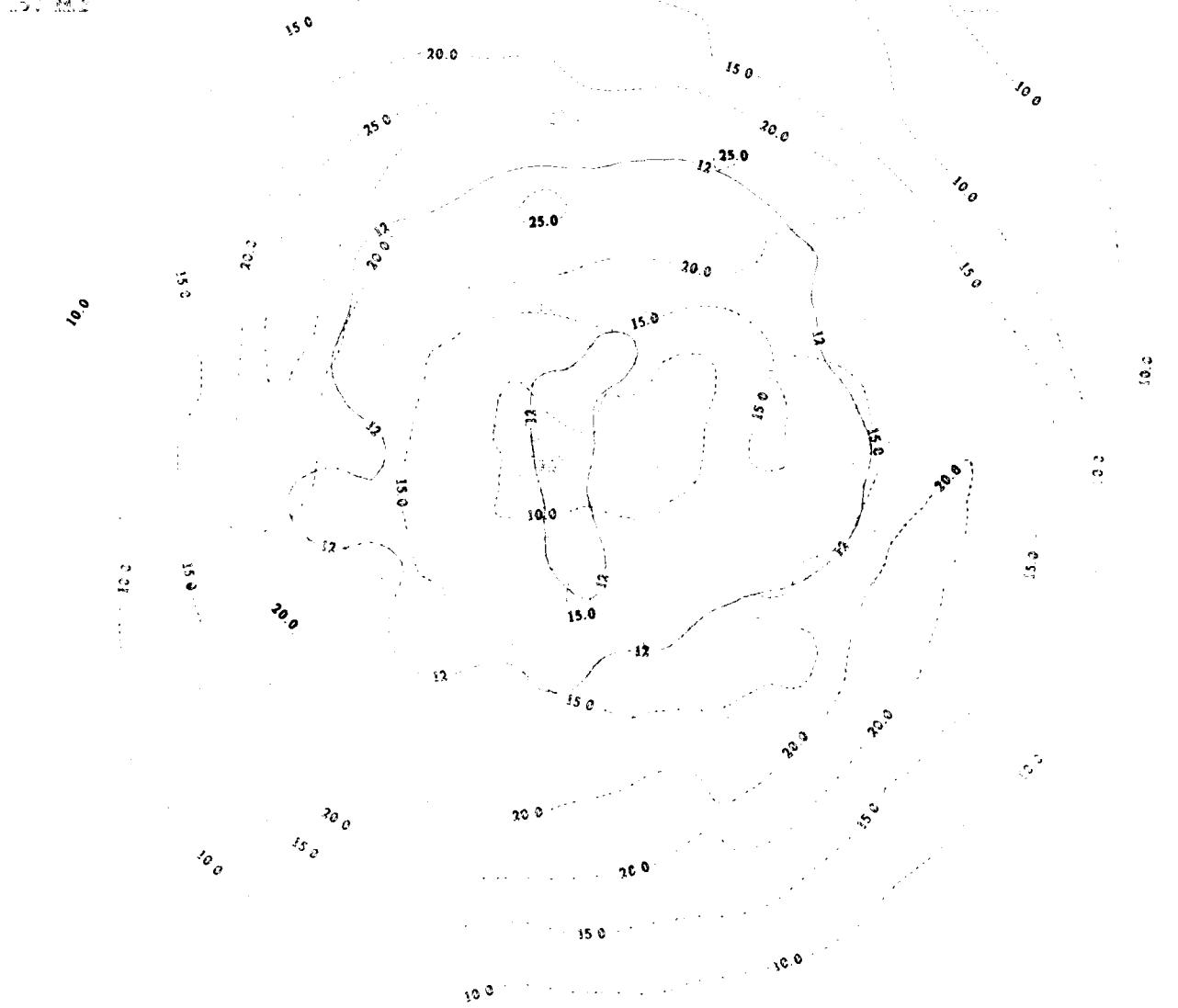
Vector Std Dev (kt)

April

150 MSL

Upper Air Climatology

Northern Hemisphere



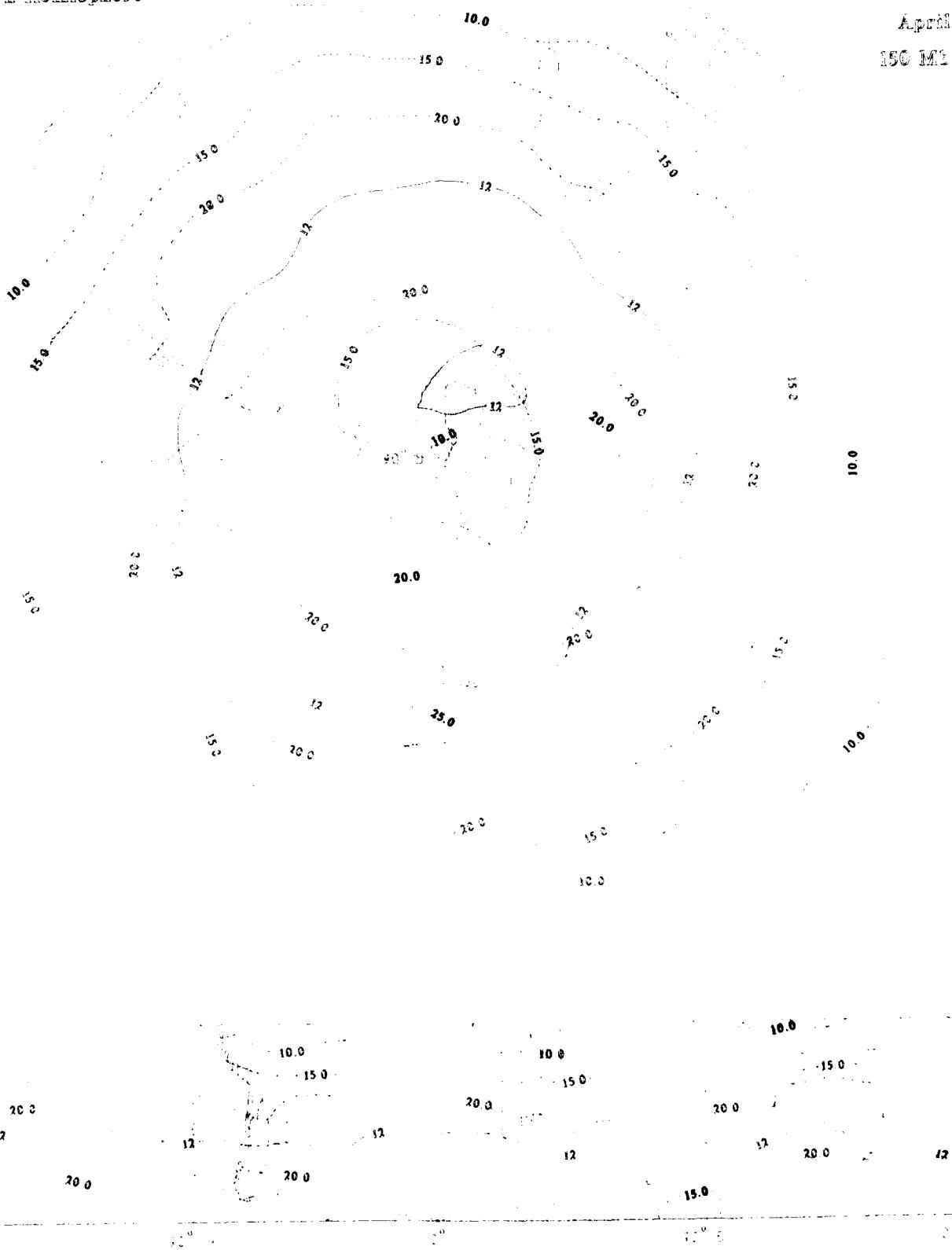
Upper Air Climatology
Northern Hemisphere

Height (dkm) Std Dev <Solid>

Vector Std Dev (kt)

April

150 MHz



Height (km) Std Dev <Solid>

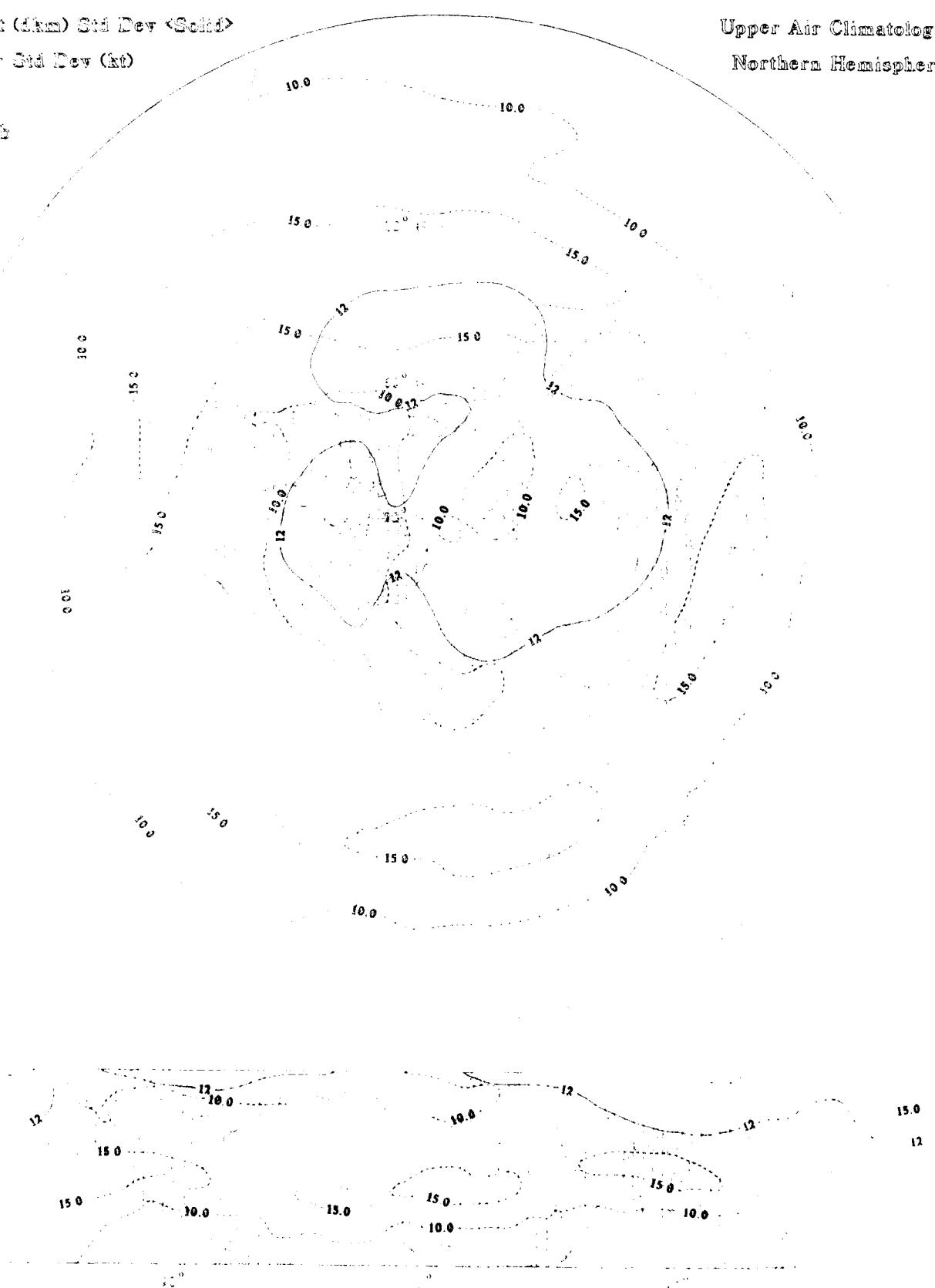
Vector Std Dev (kt)

April

200 Mb

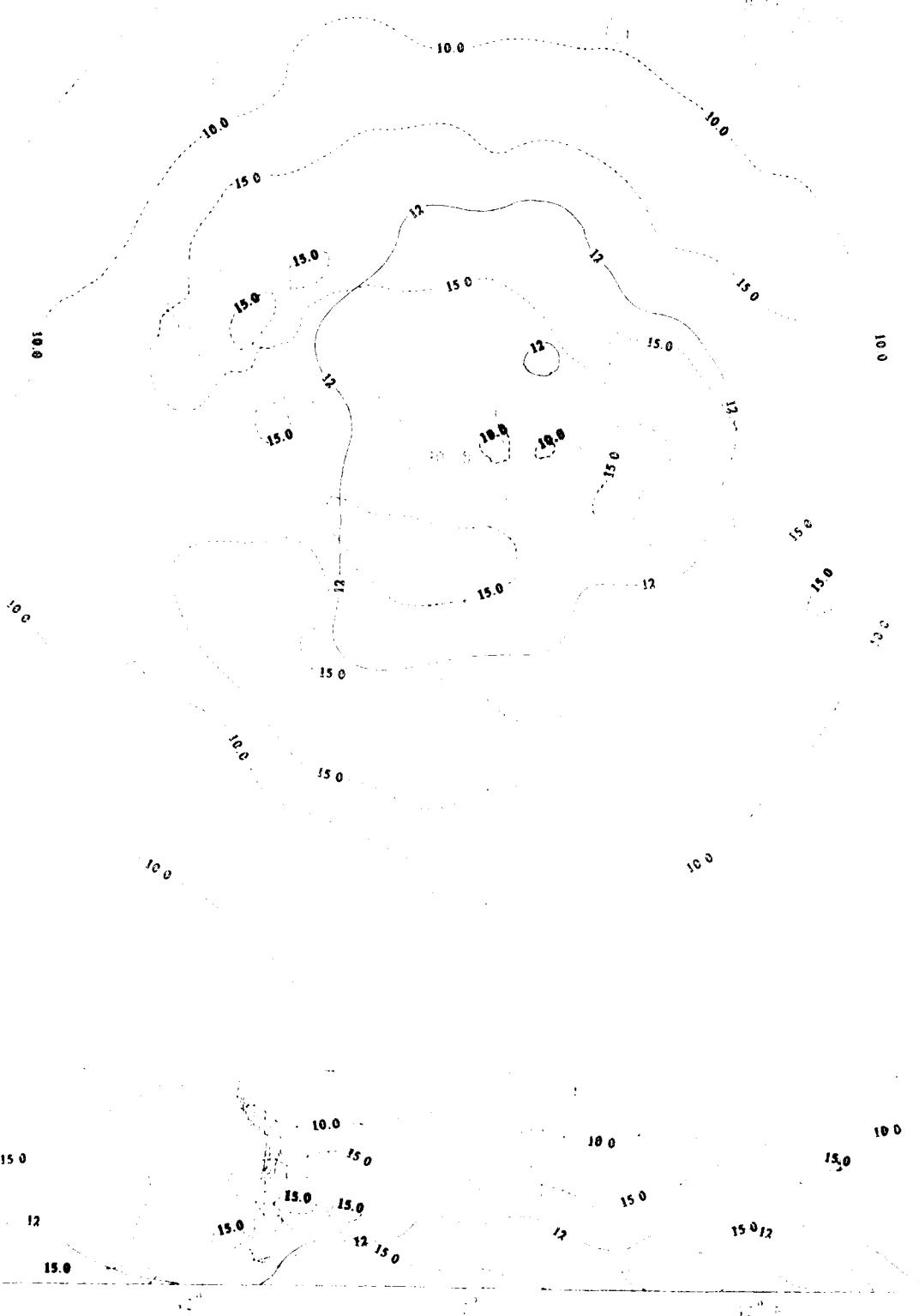
Upper Air Climatology

Northern Hemisphere



Upper Air Climatology
Southern Hemisphere

Height (dkm) Std Dev <Solid>
Vector Std Dev (km)
April
100 Mb



Height (dkm) Std Dev <Solid>

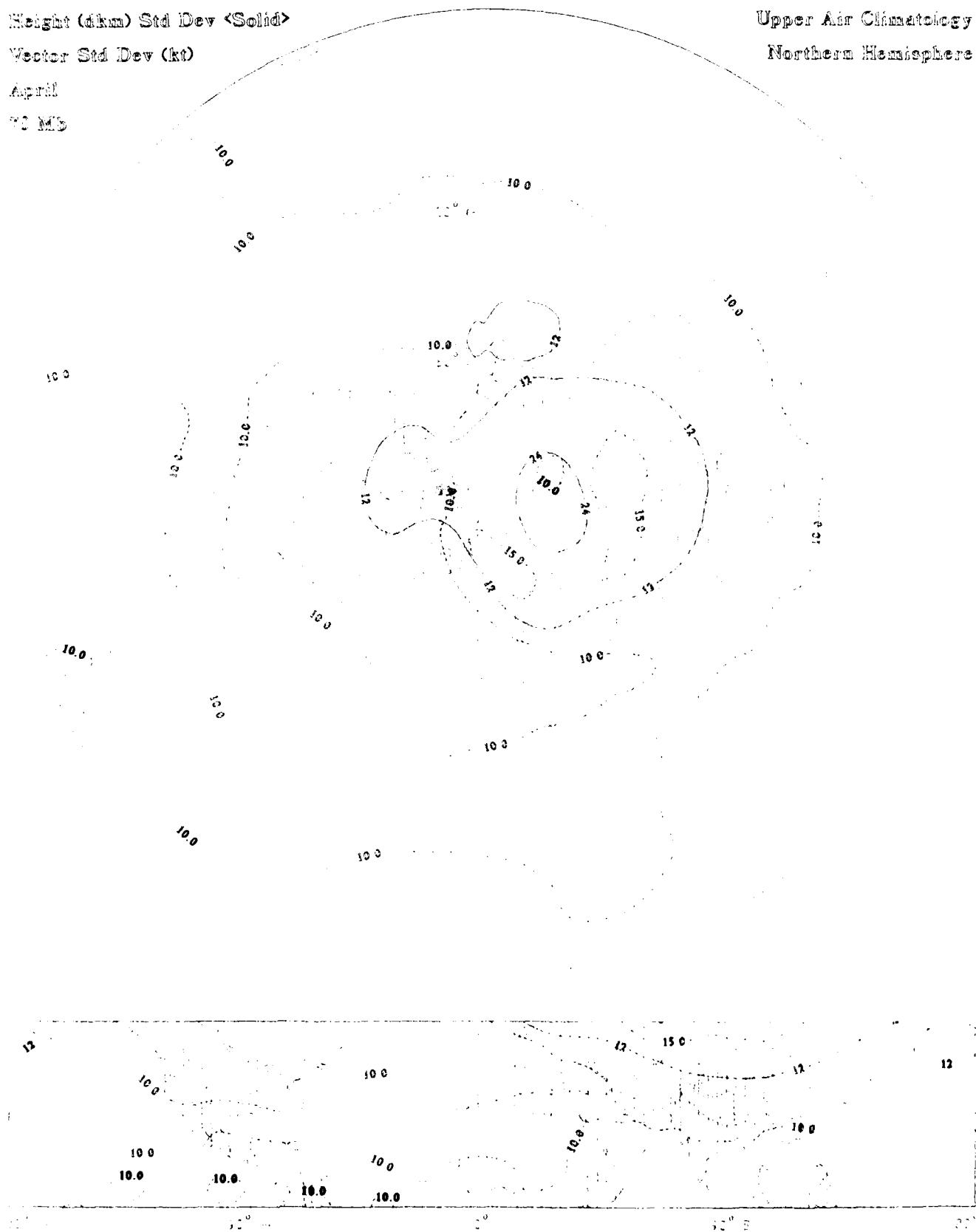
Vector Std Dev (kt)

April

92 MB

Upper Air Climatology

Northern Hemisphere



Upper Air Climatology Southern Hemisphere

Height (dkm) Std Dev <Split>

Vector Std Dev (km)

卷之三

70

Height (dkm) Std Dev <Solid>

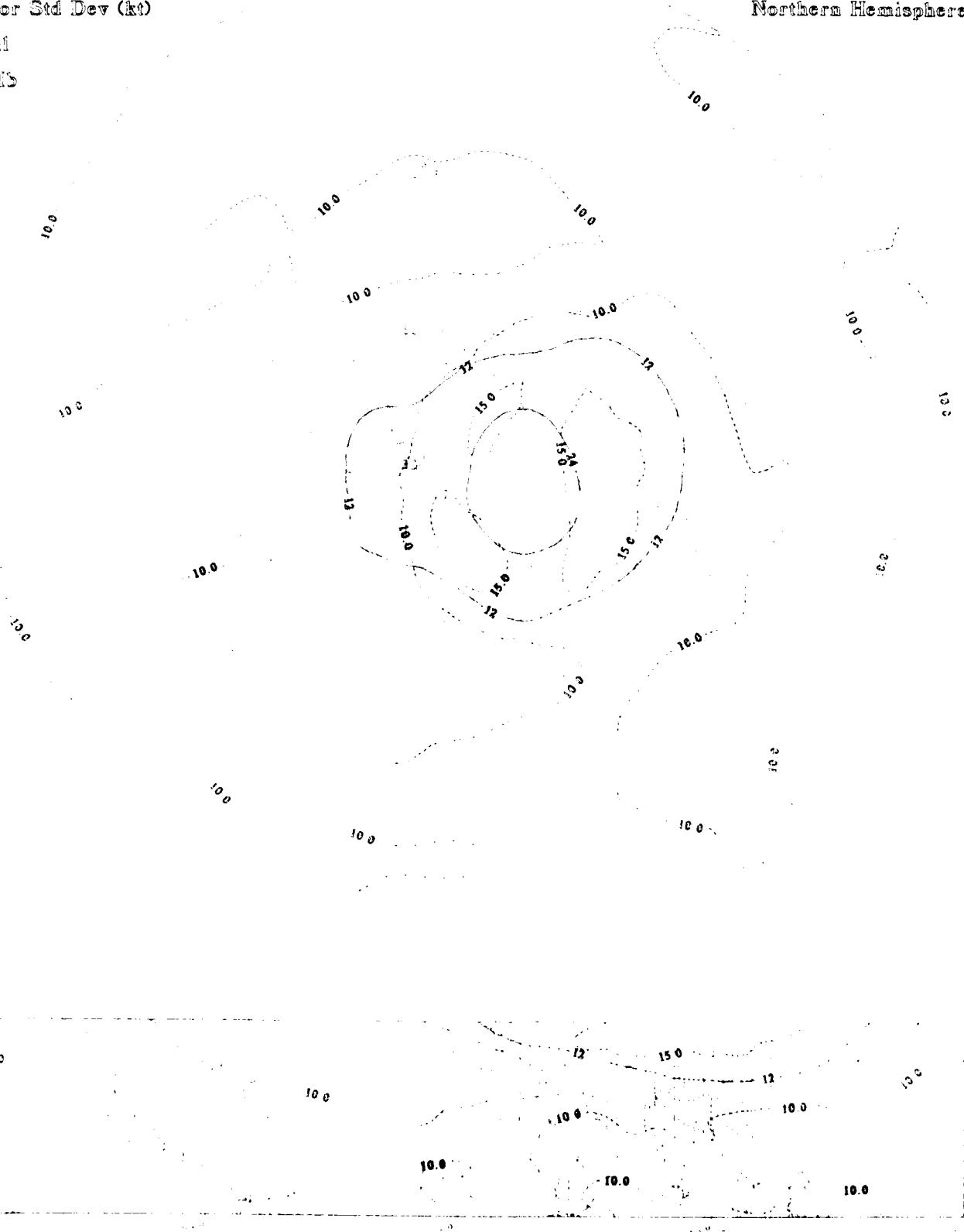
Vector Std Dev (kt)

April

50 MD

Upper Air Climatology

Northern Hemisphere



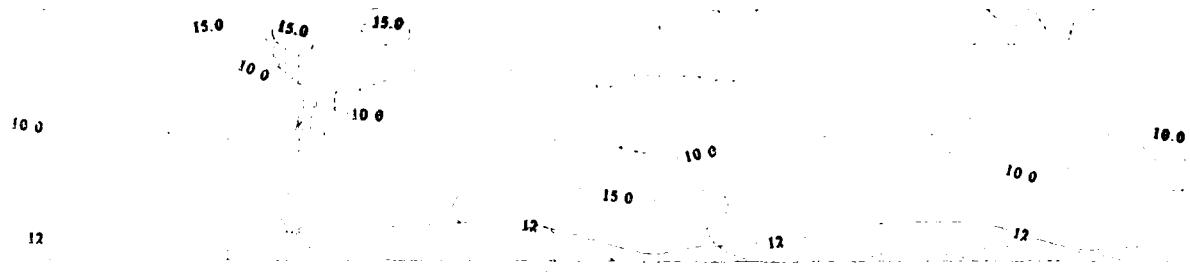
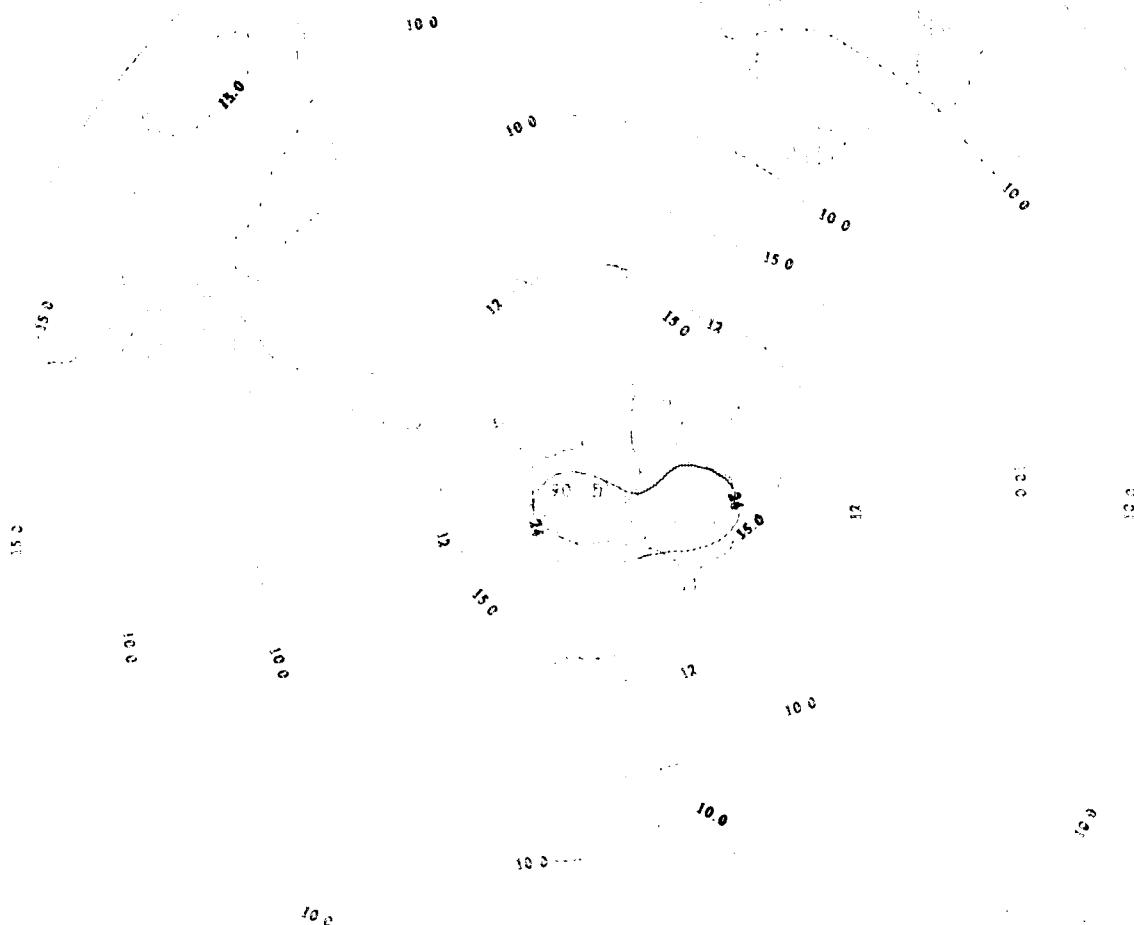
Upper Air Climatology
Northern Hemisphere

Height (dm) Std Dev <Scd>

Vector Std Dev (ft)

April

50 MHz



Height (dkm) Std Dev <Solid>

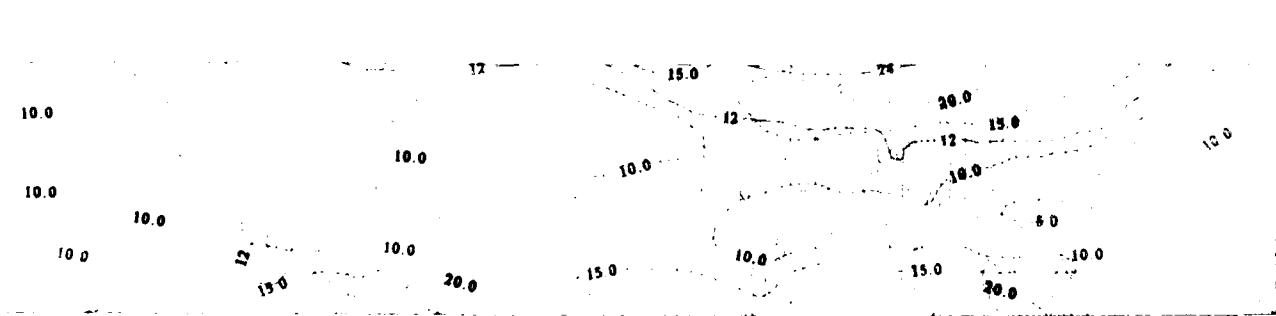
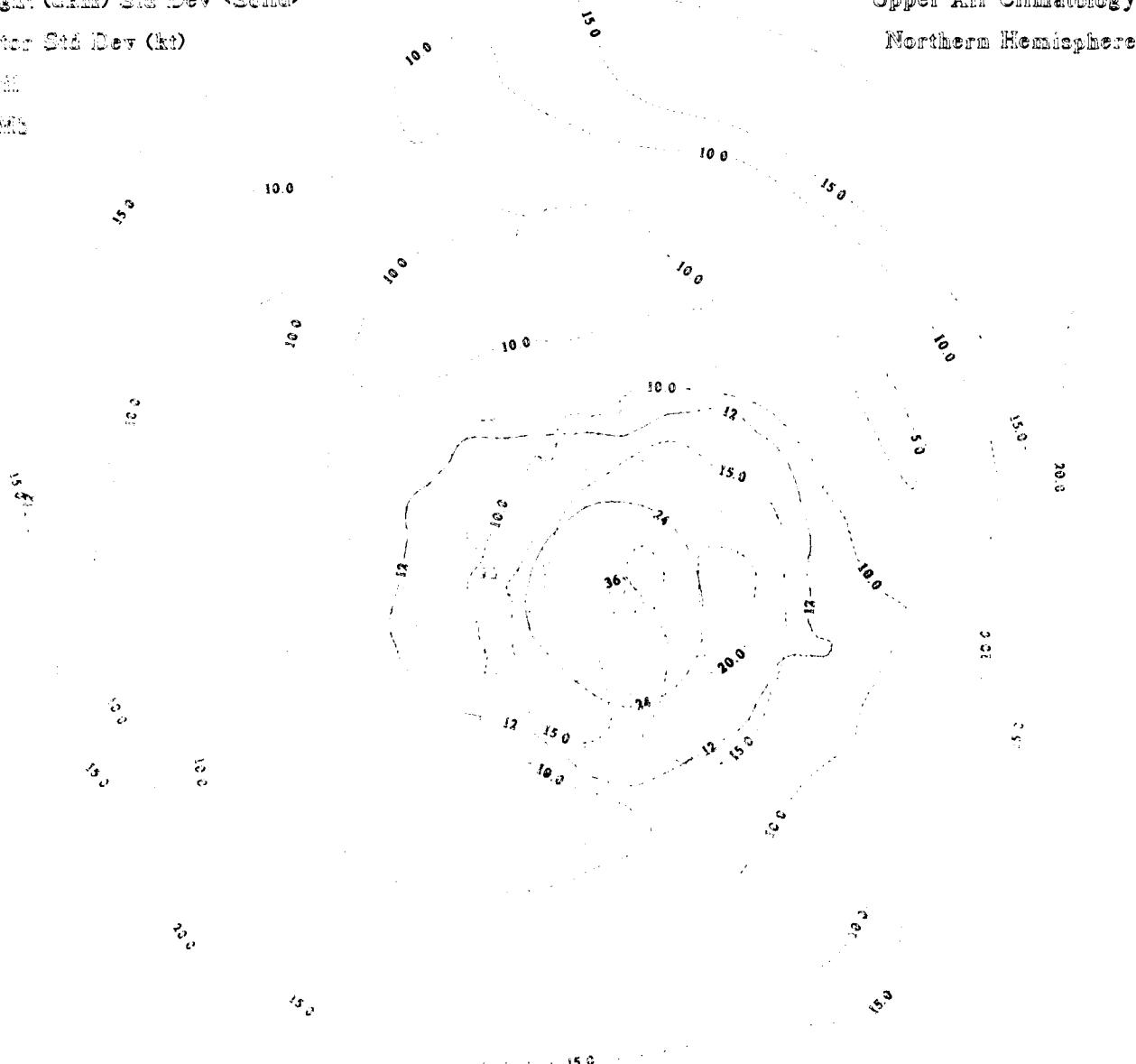
Vector Std Dev (kt)

April

00 MLT

Upper Air Climatology

Northern Hemisphere



Upper Air Climatology
Northern Hemisphere

Height (km) Std Dev (Solid)
Vector Std Dev (m)

